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Improved Evaporator.

It is a well-known fact that sugar, in any form, submitted to a temperature of 400° Fah., caramelizes, *i.e.*, turns brown; it is, in fact, fused and is no longer crystallizable; hence the absolute necessity of a low temperature to obtain the crystallization of all the crystallizable matter in saccharine juices, and avoid molasses of a tarry appearance and nature. Another fact is, that where the pressure of the atmosphere is partly or wholly removed, evaporation is more active, and ebullition obtained at a much lower degree than 212° Fah. Hence the application of a hot-air chamber, in this evaporator, gives evaporation in a comparative vacuum, thereby helping crystallization in the case of saccharine matters, besides saving considerable time and fuel

Fig. 1

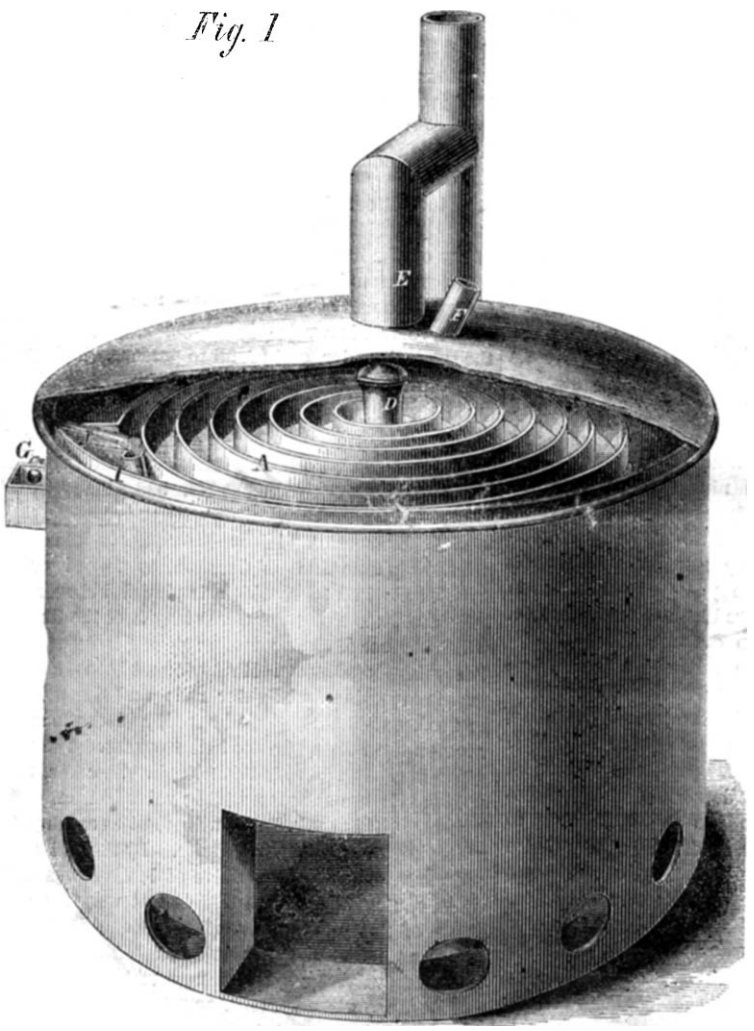
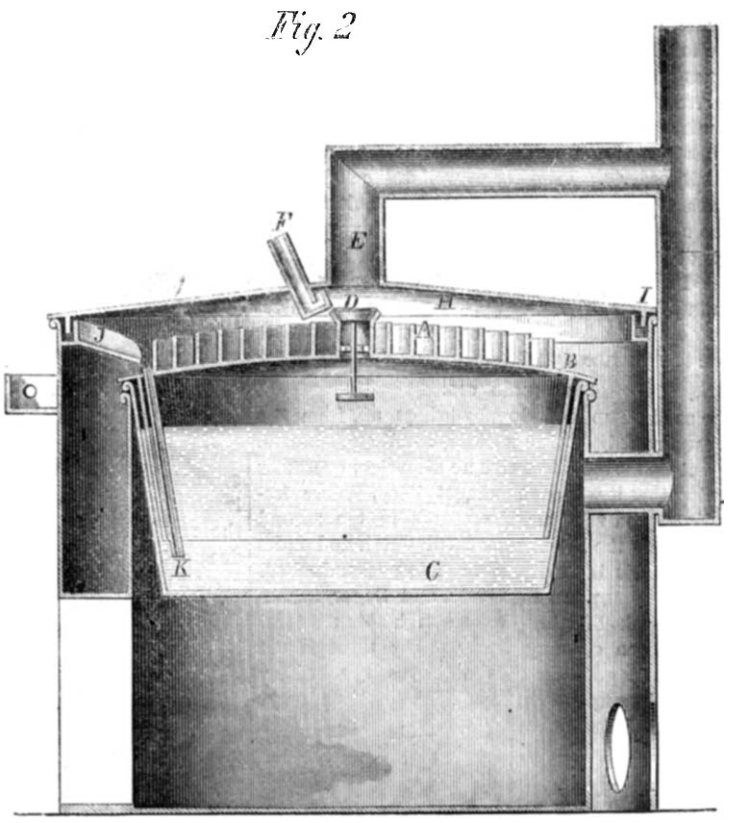


Fig. 2



KOHLY & CURTIS'S EVAPORATOR.

The evaporator proper consist of a scroll-shaped passage, A (Fig. 1), formed by matallic walls on the top of the case, B (Fig. 2), and a boiler, C, wherein said chamber sets. This boiler is partly filled with water, and it is the steam from the water which supplies the requisite heat to evaporate the fluids contained in the channels, A. The heat is prevented from getting too great by the safety valve, D, inserted in the case, B; it being well known that for certain pressures the steam has a certain degree of heat which this safety valve, therefore, regulates by rising when the pressure is too great. Through the pipe, E, this steam escapes into the main flue, and this aids the draft in the furnace of the boiler beforementioned. The liquid to be vaporized is admitted through the pipe, F, and discharged at G (Fig. 1), and whatever moisture condenses on the roof, H, of the boiler, flows down it to the joint, I, which it fills and keeps tight while any surplus falls into the trough, J, and returns through it and the pipe, K, to the boiler again. It is claimed for the action of the steam escaping through the valve, D, that it creates a partial vacuum in the evaporating chamber, and thus facilitates the process.

The various advantages of this apparatus are as follows:—Perfect regularity of the heat applied; impossibility of scorching the saccharine matters; a considerable saving of time in evaporation by a constant flow in and out uninterrupted; the absorption of moisture by the dry air, and the ebullition in a comparative vacuum. The apparatus can be made self-skimming, if required, avoiding thereby a very filthy and tedious work; a great economy of fuel, as every particle of waste heat from the whole apparatus can be turned to account, after it comes out of the evaporator, to warm the contents of the feeding tank or vat. The whole operation must, of necessity, be cleanly done; the apparatus, being covered, no dust, flies, wasps, smoke, or other matters, can get access to it and spoil the contents. In naked fire evaporators it is not usual to start the fire before the cane mill. In this one it is quite different, and no matter how brisk the fire, it is impossible to injure the sirup.

The apparatus can be applied to any common farmer's boiler, or to larger ones, by a slight alteration, viz., removing or putting a tight bottom under the rim below the volute channel, and forcing the steam by a hole in the side of the under rim.

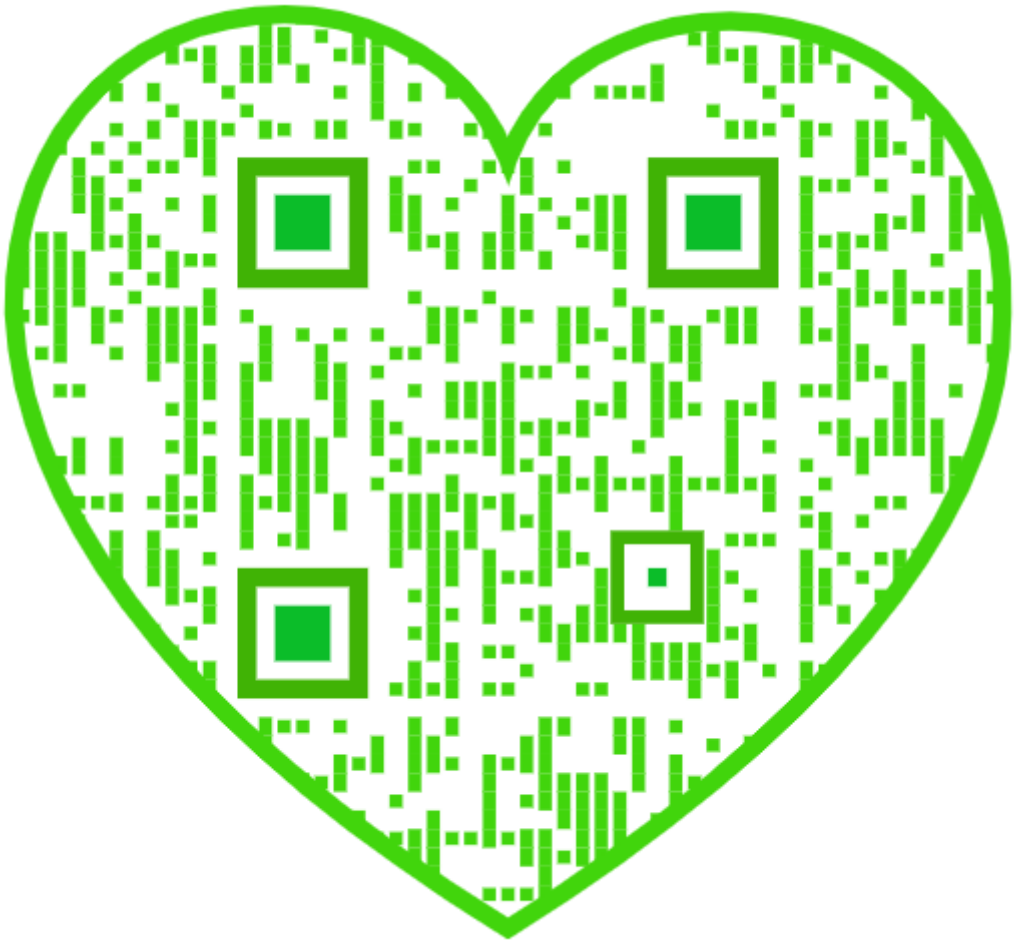
The apparatus is so simple and compact that it can hardly, if properly constructed, get out of order; it is light, and takes very little room when not in use, and is also very easy to clean. It can be applied equally to the evaporation of all saccharine matters, condensing of wine and cider, also to salt water, and many other uses in chemico-industrial works.

"To illustrate the enormous amount of flowing and evaporating surface," says the inventor, "a common apparatus, 6 feet in diameter—the size for sorghum and maple-sugar makers—would give an area of 27 square feet, and 58 feet length of channel. For plantations and large factories this apparatus will show a striking advantage in the single item of economy of room required for attaining the object in view, without speaking of other advantages enumerated above."

For the sale of State and territorial rights apply to the inventors, H. Kohly or J. Curtis, Potosi, Mo.

INK FOR ZINC.—The following is a recipe for indelible black ink to be used for writing on zinc:—Take 30 parts of verdigris, 30 of sal-ammonia, 8 of lamp-black, 8 of gum-arabic, and 300 of water; dissolve the gum in water, and pour it over the other ingredients, well mixed and reduced to powder. A quill pen should be used for writing.

THE United States Pacific Railroad Telegraph line will be complete from Chicago to San Francisco in one year from the present time. Twelve hundred miles are already under contract, to be completed in 1865. This will make the second telegraph line to the Pacific, one being already in operation.



THE OIL REGIONS OF PENNSYLVANIA.

A great deal of worthless trash has been written and published concerning petroleum, its origin and development; but we have, at last, a work which will both amuse and instruct all who are curious to peer into the mysteries of the oil speculations.

The Messrs. Harper & Brothers have just issued a work, entitled, "The Oil Regions of Pennsylvania. Showing where petroleum is found, how it is obtained, and at what cost; with hints for whom it may concern. By William Wright." The author is an energetic and thorough man, and pursued his investigations with industry and enthusiasm. Mr. Wright has been a frequent contributor to the columns of the SCIENTIFIC AMERICAN, and is the author of some articles upon petroleum which appeared in our last volume. We make the following selections from his valuable work:—

INDUSTRIOUS PEOPLE.

No community on the face of the earth has a smaller proportion of drones to the number of working bees than Petrolia. This observation applies to city, village and single shanty. Nobody but has a hand engaged in *some* business or pursuit; many in half a dozen. If a man betakes himself to mercantile life, he reckons upon giving it from twelve to fifteen hours per day, filling up his leisure moments with speculation or an agency. The young fellow who would stand at the street corners elsewhere, there kills two birds with one stone by offering to sell wells, or interest in wells, or leases, or refusals to those whom he can button-hole. If Satan found mischief only for the idle, his occupation would be gone in the oil region. Perhaps the high cost of living has impelled the slothful as well as the diligent to this remarkable activity, but it seems to be an admitted principle on all hands that people have gone thither to work. On this account the country is essentially orderly. Property as well as life is more secure than in any Eastern city. Even drunkenness is by no means as common as might be expected, in view of the rough-and-tumble modes of life prevalent. I have seen less of it in Oil City or Titusville than in country towns of the same size elsewhere. Yet I do not believe that one man in fifty is a member of the temperance association.

STRIKING OIL.

The sand pump occasionally brings up, from the first sand rock below the surface, small quantities of oil; but this is apt to receive no attention, operators knowing that it will soon exhaust itself. More frequently a good vein may be struck in the second rock; but on the lower part of Oil Creek and on its tributaries this is usually allowed to pass unheeded. On the Alleghany and on French and Sugar Creeks they seldom drill further than through this stratum. Elsewhere, on entering and passing through the third layer, "a good show" is most eagerly looked for, as the sand-pump comes up, filled with the gray, sloppy mass from beneath. If this begins to turn darker in color, separating into a thick, heavy sediment, which settles on the ground, and a green, slimy liquid, which floats away toward the nearest hollow, great indeed is the rejoicing; for the prospect of one hundred thousand dollars is within view. Indeed, the vein struck may, in an instant, anticipate reamer, sand-pump, tubing, and every thing else, sending up a spirt of petroleum which shall smite the top of the derrick and drive away the workmen, its rage only cooling sufficiently to permit them, after the lapse of a day or two, to return, insert the tubes, and guide the generous overflow into the cistern.

OIL WELLS ARE UNCERTAIN.

Of those which were bored as early as 1861, I think it is safe to estimate that not more than one in a hundred have continued to yield steadily ever since, and are now affording enough to pay operating expenses. The Economy wells, at Tideoute, are most remarkable exceptions in this respect. The fact that that spring should have been reached within one hundred and fifty feet of the surface, makes the "record" of those works the more interesting, Certainly the whole region of Petrolia has no parallel cases to these; and at this moment I do not recall a solitary instance where a well, no matter to what depth sunk, has continued to flow or pump, without serious interruption, for four years, as they have done. Let no lucky adventurer who may strike oil lay the flattering unction to his soul, that the spring which foams and bleeds so profusely in his presence will continue to pour forth oil in paying quantities for four, three, or perhaps even two years. Before the end of eighteen months it will not only call frequently for repairs and renewals, but probably have settled down to figures so modest as barely to cover working expenses. An oil-spring insurance company, did such exist, would not issue a policy, upon the first discharge of a well, that it would hold out longer than twelve months; at any rate, it would be unsafe to accept the risk of its continuing to yield more than ten per cent of the average of its first month's production. Indeed, experts have assured me that they have set down nine months as the ordinary period.

NUMBER AND YIELD OF OIL WELLS.

The number of wells denotes, not the engines which were pumping merely, but those which were pumping oil on the days of my visit. On the Tarr and other farms I estimate that at least fifty more were at work, exhausting the water, making the active aggregate three hundred and seventy-five.

RECAPITULATION.

Sections.	Wells in Operation.	Total Yield. Barrels.	Average Per Day
Watson Flats, Etc	21	362	17·1
Miller Farm	1	28	28·0
Foster & McElhenny Farms	15	523	34·9
Funk & Boyd Farms	16	648	40·5
Wash. McClintock Farms	15	345	23·0
Hyde & Egbert Farm	6	725	120·8
Storey Farm	22	855	38·8
Tarr & Blodd	19	411	21·6
Rynd & Widow McClintock Farms	14	147	10·5
Rouse & Buchanan Farms	17	415	24·4
H. McClintock to Oil City	16	682	42·6
Oil Creek Valley (total)	162	5,141	31·7
Cherry Run	51	1,972	38·7
Pithole Creek	3	300	100·0
French and Sugar Creeks	14	50	3·6
Lower Alleghany	51	404	7.9
Upper Alleghany	31	666	21·5
Omitted	10	317	31·7
Grand Totals	322	8,850	27·5

At this rate the annual product of petroleum may be set down at three million nine thousand barrels. We can very well afford to leave out of the account the odd thousands and accept the round three millions as the amount of very sensible perspiration which has exuded from the pores of our common mother in that 20 miles square block of Pennsylvania.

PROBABLE YIELD OF WELLS.

From the best information accessible, I am led to estimate the average period of a good well's productiveness at eighteen months. In a majority of instances the repairing and tinkering done after that date does not pay. In any case the purchaser should be careful not to accept the first day or two's yield thereafter as what it will be on the average. Now, to reach one productive source, with all the knowledge that has been gathered, it is necessary to put down five wells. Some persons say that one-fourth of those now sunk become profitable; but taking the entire oil region, I am within the mark in setting down the ratio at one in five. Now, assuming that machinery has only to be provided for the first, and that the depth will be five hundred feet, the cost of renewals will amount to twenty-five thousand dollars. This multiplied by four hundred, the number of works already or prospectively yielding, would require an outlay, every eighteen months, of ten million dollars. I do not see how this heavy drawback can be safely reduced below five million dollars per annum, which would imply renewal only once in two years. In point of fact, the newly invested capital in the oil region is used to replace the old works as they give out, much of the original capital having disappeared for ever, either as unearned dividends, or gone to the wrong side of the profit-and-loss account.

Lastly, we have the Government tax of one dollar per barrel on crude petroleum. There is a short and easy method of arriving at the amount of that: If the yield for 1865 be three million five hundred thousand barrels, the excise duty will amount to precisely three millions and a half of dollars.

We are now in a position to cast up the account as follows:—

Value of the crude oil at the wells (say)	$24,000,000
Operating expenses	$2,500,000
Cost of replacing works	5,000,000
Government excise	3,500,000—11,000,000
Net profit (say)	$13,000,000

This would pay seven per cent per annum, on a *bona fide* capital of one hundred and eighty-five million seven hundred and fourteen thousand dollars.

The political and commercial aspects of the subject are considered by the author, who offers the following estimates and conclusions:—

"That the wells in process of sinking will yield enough to make the supply keep up with what it now is, I have no manner of doubt. The prospect for 1865 is, that they will do considerably more than this; for 1866 they will at least equal it; beyond that year it is not advisable to venture on calculations or estimates of production in a field where the law of lawlessness has all along prevailed.

"If we add to the revenue to be derived on crude oil, that which is already being received upon the refined article (twenty cents per gallon), the aggregate receipts into the United States Treasury cannot fall below twenty million dollars, and may amount to twenty-five millions, during the twelve months stated. Of course, all this comes out of the pockets of American people as consumers; yet there is, perhaps, no other source, yielding so much revenue, where the load would be felt less oppressive than on this article, as is manifest from the fact that petroleum not only maintains its sway, in spite of these heavy impositions, but is extending it in every direction.

"It may be observed here that, by the present law, the greater portion of the lubricating oil nearly escapes taxation, the excise duty of one dollar per barrel on the crude article being barely three per cent on the selling value at the wells. As most of it is used in that condition, it is manifest that the revenue suffers considerable loss, or else the imposition is too heavy on the illuminating kind. A thorough revision of the whole subject is one of the first matters to which Congress should give its attention."

The volume is a valuable handbook, entertaining to the general reader, and useful to persons who hope to make their fortunes by "striking oil."

A New Atmospheric Railway

A new railway, worked by stationary steam-engines, has of late been exhibited at No. 338 Albany Road, near Camberwell Gate. This railway is the invention of a Mr. Halliwell, and is worked, somewhat like the old atmospheric line at Croydon, by forced or exhausted air in a tube, which is placed between the rails, and runs along the whole length of the line, by which the use of the locomotive engine is superseded. The patentees, Messrs. Halliwell and Allison, claim for the invention that lighter rails and sleepers can be used, one-half of the coal saved, and the tear and wear on the rails made not half so great. The tube, which is of cast iron, is 18 inches in diameter, more or less. On the tube is a sliding valve of iron, which is so tight, it is said, that it will stand as much pressure as any other part of the tube. By the old atmospheric railway, a lifting valve of leather was used, which could not be made tight, and was the main cause of its failure. A stationary engine will be placed at intervals of five miles, more or less, with self-acting valves, so that through trains may be run any distance without stopping. With regard to the speed of the train, that, it appears, may be carried as high as fifty, or even a hundred miles an hour. *Trade Circular.*

Water Tanks for Ships.

The question of the best and safest material for the construction of water tanks for ships is being discussed in France. Galvanized iron, it seems, has been employed in the French navy, but this is condemned by M. Roux, the author of a memoir on the subject, who finds zinc in the water kept in such tanks, and in such quantities that he considers the liquid unfit for domestic uses. M. Roux has also made experiments on the preservation of water in tanks that have been ungalvanized by removing the coating of zinc with hydrochloric acid, which we may suppose to represent plain iron vessels. In one of these he placed distilled water, in another water issuing from the green sand and containing some chloride of sodium, and in a third river water containing more chloride of sodium. He found the largest proportion of oxide of iron with the distilled and river water. He recommended for the Imperial navy water tanks tinned inside and galvanized outside, but he does not say how such tanks are to be made.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

PAPER AS A MATERIAL FOR SUGAR MOLDS.

The molds used in sugar refineries are sometimes made of clay, sometimes of zinc or of plated copper, occasionally of glass, but, at least in France, most frequently of sheet iron, either painted or enameled. The great disadvantage of such molds is that the paint or enamel upon them invariably cracks after a time, whereupon, if the defect be not instantly remedied, the portion of metal which the crack lays bare rapidly oxidizes, causing the mold to deposit upon the sugar spots of rust, which greatly deteriorate its value. This disadvantage on the part of the molds in common use led MM. Dufournet et Cie., of Clichy, about seven years ago, to turn their attention to *papier mache* as a material for sugar molds, and it is stated by M. Clemandot, in a paper on "The Industrial Applications of Stiffened Pasteboard," which he lately read before the Society of Civil Engineers of France, that nearly a hundred thousand of their paper molds have now been in use for nearly six years, without any one of them requiring repair. The first cost of the paper molds is somewhat greater than that of iron molds, but iron molds cost an average of a franc and a half each per annum for repairs, so that, to set against the excess of first cost on the part of the hundred thousand paper molds, is the saving of the nine hundred thousand francs which six years' repairs of the same number of iron molds would have cost. The paper molds are still in excellent condition, so that the saving already realized does not represent by any means the full economy to be effected by their use. This is the first instance, we believe, in which *papier mache* has received any extensive application, but it is not likely to be the last. The lightness and cheapness of this material, together with its non-ability to breakage and its power of resisting the action of chemical agents, render it well adapted to replace glass, porcelain, and gutta-percha, for a great many purposes. MM. Dufournet et Cie. have begun to make of it basins and funnels for photographers, cells for electric batteries, and many other similar articles.

VITRIFICATION OF PHOTOGRAPHS.

M. Regnault has presented to the Academy of Sciences some specimens of vitrified photographs produced by a still more elegant method than that which was described in these columns a few weeks since. This method is the invention of MM. Marechal and Tessie du Motay, and is a development of the principles which serve as the basis of photography in salts of silver upon paper and collodion. The inventors begin by dissolving four parts of caoutchouc in a hundred parts of benzine. They add to the solution so obtained one part of plain collodion dissolved in ether, and then pour the mixture upon the glass or porcelain plate, vessel, or other object upon which they design to produce and fix the intended photograph, so as to cover with a thin film of it the surface upon which the photograph is to be produced. After having been dried, either in the open air or in an oven, this caoutchouc-collodion film adheres to the glass or porcelain very firmly. When the film is quite dry, a layer of iodized collodion is poured over it This second film "unites ultimately with the first, and thus acquires a resistance at least equal to that of a sheet of caoutchouc of similar thickness, a resistance which no kind of collodion possesses." The next step is to immerse the double film thus prepared in a nitrate of silver bath, and then to expose for a picture, either in the camera or in the printing frame. The picture may be developed by any of the solutions ordinarily employed for that purpose, but must be fixed by the successive action of two baths, one containing a solution of iodo-cyanides, and the other of cyanides (alkaline). When thus fixed, it is immersed for a few minutes in a solution of sulphate of protoxide of iron, or in one of pyrogallic acid, or of any other acid which will reduce the salts of silver. It must now be intensified by means of the reaction of either pyrogallic, gallic, or formic acids, or of a solution of sulphate of protoxide of iron, upon a solution of acid nitrate of silver. If what is to be produced is a vitrified photograph on glass, intended to be seen by transmitted light—to be viewed, that is, as a transparency—an amount of intensifying will be necessary which will require from twelve to fifteen baths; but if the picture, whether it be on glass, porcelain, or other silicious material, is to be viewed by reflected light, from four to six intensifying baths will be sufficient. During this process of intensifying the pictures must be well washed, two or three different times, alternately in a bath containing iodo-cyanides and in a bath containing simple cyanides, and immediately afterward in a bath containing pyrogallic acid, solution of sulphate of protoxide of iron, or any other body capable of reducing silver salts. The object of these frequent alternate washings in iodo-cyanide and cyanide baths is to dissolve away every particle of silver which does not actually go to the formation of the picture—both the non-adherent argentic powder which is precipitated upon the whole surface of the picture by each intensifying bath, and the pulverulent or incompletely reduced silver, which, in ordinary photographs, constantly remains united to the metallic silver after the development and fixing of the picture, resisting the solvent action of the hyposulphites of ammonia, and that also of alkaline cyanide baths, employed alone. It is in the means which it affords of removing this superfluous silver, without touching the completely-reduced silver forming the picture, and of using as the medium on which first to produce the picture a film strong enough to permit of many washings and intensifyings without the picture getting displaced or torn, that the essence and value of MM. Marechal and Tessie du Motay's very beautiful and ingenious process consist. The washing in a reduced bath with which they follow each series of washings in the iodo-cyanide and cyanide baths is for the sake of rendering the surface of the metallic silver forming the picture again neutral, or acid, and so bringing it into the condition in which the intensifying bath can best act upon it. After the picture has been sufficiently intensified, it is immersed for an hour or more in a bath of either chloride or nitrate of platinum, or in one of chloride of gold, or one in chloride of gold and one of nitrate of platinum alternately. This causes the silver of the picture to be partially replaced, in the one case by platinum, in the second by gold, and in the third by a mixture of platinum and gold. "The object," says the inventors, "of these several baths substitutive of the film of silver is to vary either the color or the nature of the picture after it becomes vitrified. For when we propose to obtain in the muffle furnace, by the action of boracic or silicic fluxes, pictures of a greenish black color, we previously immerse the picture in a bath of chloride or nitrate of platinum; when, on the contrary, we wish to obtain black pictures, we immerse them consecutively in baths of chloride of gold and nitrate of platinum. Lastly, when we desire to produce pictures in gold, we substitute exclusively baths of salts of gold." On leaving the plaitinum or gold bath the picture is washed in a saturated solution of ammonia, or in a solution of an alkaline cyanide, and is then dried, covered with an india-rubber or gutta-percha varnish, and submitted to the action of the muffle until the organic matters are all burnt away and only the metals forming the picture are left. It is then cooled, covered with a boracic or silicic flux, and finally exposed to an orange-red heat, which vitrifies it. The photographic picture is then rendered absolutely permanent—a fact which points to the probability of the vitrification process being restored to not merely as a means of producing pictures upon glass, for stained windows and the like, and of ornamenting objects of ceramic art, but also as a means simply of preserving photographs from decay.—*Mechanics' Magazine.*

Puzzle Jugs.

The puzzle jug was an ale jug, and so contrived, by perforations in various parts, and by open work in the neck and spout, as to render it impossible to use it like other jugs. The liquor being drawn into the jug by the tapster, the puzzle was for the customer to drink it all without spilling. It became a prolific source of wagers, and most alehouses found it to their advantage to keep one or more of different forms for their visitors. The handle usually sprang from near the bottom of the jug and was carried up its "belly" some distance, when it bowed out in the general form, and was attached to the rim at the top. The handle and rim were made hollow, opening into the inside of the jug near the bottom, and around the rim were attached a number of little spouts, differently placed, according to the whim of the potter. The ale could thus only be drunk by carefully covering up with the fingers all the spouts but one, and through this one the liquor would have to be sucked into the mouth. Beneath the handle a small hole was, however, usually made, through which, if not carefully and closely covered, the ale would spill, and thus cause the discomfiture of the drinker and the loss of his wager.—*Life of Wedgwood.*

Interesting to Photographers.

The following simple and practical method of receiving the solid silver from old solutions will prove of great value to photographers. We copy from the *British Journal of Photography*:—

"From the frequency with which inquiries seem to be made respecting the recovery of silver from old baths and wasted solutions, it would seem that the methods generally prescribed, simple as they are to any one in possession of a laboratory, yet present difficulties to amateurs out of the reach of furnaces, and that a yet simpler method of obtaining reduced silver in a compact fused form (in which state alone can it be safely relied on for furnishing pure nitrate) is for such persons still a desideratum. The following method will, it is hoped, put the recovery of silver in a compact and pure state within the reach of all, even in the most ill-furnished positions.

"Precipitate old nitrate baths with chloride of sodium in excess, and old hypo baths with "liver of sulphur" or sulphide of potassium, or, if this cannot be procured, with the yellow solution obtained by boiling lime and sulphur together for some time in water. The chloride and sulphide of silver thus obtained, after washing and drying, are then to be mixed with two or three times their weight of powdered nitrate of potash or saltpeter. Select a solid piece of well-dried wood, of dimensions in the proportion of about eight inches cube to half a pound of the above mixture; place a small quantity, say half an ounce, on the upper surface, and thrust in the red-hot end of a burning stick. When deflagration has fairly commenced, and a cup-shaped cavity has begun to form, add the remainder of the mixture, in small quantities at a time (for fear of its overflowing) by means of a spatula or spoon. If this has been skillfully done the whole quantity may be added without loss; and after the combustion is completed, there will be a deep cavity in the block containing the reduced silver in a spongy form, in the midst of a cake of carbonate and sulphate of potash and chloride of potassium. The whole is to be scooped out and thrown into water, which dissolves the salts, leaving the silver sponge, which, after drying, is ready for the second operation.

"In the above process the niter, in contact with the burning wood, furnishes oxygen to it, thus blowing the fire, so to speak, and keeping up a vigorous combustion, and in so doing becomes itself reduced to carbonate of potash, which at a red heat readily decomposes chloride of silver. The final result of the two steps of the operation may be thus represented:—

$$KO\,NO_5 + Ag\,Cl + 3\cdot C = Ag + K\,Cl + N + 3\,CO_2.$$

For fusing the spongy silver into a compact mass, a mixture known as Baume's flux, with a reduced amount of sulphur, answers perfectly. Mix six parts of saltpeter, two parts of dry and fine sawdust, and one part of flower of sulphur. Take a large iron ladle, put a layer of flux about an inch deep on the bottom, and above this alternate layers of silver and flux, using about two parts by weight of the latter to one of the former; press the whole tightly down. On setting this mixture alight it burns with great heat, and after the combustion is over the silver will be found in a single compact button at the bottom of the ladle, and after well washing in water it will be ready for solution in nitric acid. By this method, a lump of silver weighing many ounces can be obtained with great ease in a very short space of time.

"E. Hadow.

"King's College."

We learn from the Biddeford (Maine) *Journal* that the Pepperell mills in that city increased the wages of their operatives upward of 20 per cent, so that old hands (females) are making readily $1 25 per day. The company would run all their spindles if they had sufficient help.

COMMENCEMENT OF POLYTECHNIC COLLEGE OF PENNSYLVANIA.

The twelfth annual Commencement of the Polytechnic College, of the State of Pennsylvania, was held in Concert Hall, Philadelphia, on the 30th of June, a large and intelligent audience, composed of the principal engineers, directors of public works, mechinicians and scientific and "solid" men of Philadelphia and their families, greeted the successful aspirants for college honors. The music was performed by the Germania orchestra, the best in the city, and the exercises throughout were of an impressive and appropriate character.

The introductory address was delivered by Rev. Dr. Shields, whose theme was the economical development of American industry and the means of repairing the waste of war. He eloquently portrayed the position of the country and the gradual retirement of the weapons and engines of war to give place to the implements and engines of active, earnest and peaceful industry. Already the military engineer has been sent to the rear. The mine engineer, the civil engineer and the mechanical engineer were now at the front directing the innumerable army of productive labor. The Polytechnic College sustained to-day a high national position and her success was an additional guaranty of the steady and healthy advance of the applied sciences in our country.

The charge to the graduating class was pronounced by Hon. Ex-Governor Pollock, Director of U. S. Mint, who preceded the delivery of the charge by complimentary reference to the growth of the School of Mines in the College. He sustained his views of the value of that school, not only to the great mining State of Pennsylvania, but to all the other mining States, by quoting from official sources the wonderful yield from year to year of the American mines, the lucrative and responsible position open to native mine engineers, the direct manner in which the yearly increasing amount of our mine products facilitated the entire extinguishment of the national debt.

The President of the Faculty announced that the East Pennsylvania Agricultural School had been made a Department of the Polytechnic College, and that it would be opened as such in September next on a farm of 175 acres, purchased for the purpose, in Montgomery County, Pa.

The following are the names of the graduates, and the subject of their theses:—

BACHELORS OF MINE ENGINEERING.

Frank Farmstone, Easton, Pa.—"The Construction of an Anthracite Blast Furnace."

Wm. G. Macdowell, A. B., Philadelphia.—"The Reduction of the Ores of Zinc."

Wm. Main, Jr., A. B., Philadelphia.—"Method of Attacking and Detaching Rocks."

Theodore F. White, Norristown, Pa.—"The Mechanical Preparation of Ores."

J. Price Wetherill, Bethlehem, Pa.—"The Oxide of Zinc as a Pigment; its Manufacture and Use."

BACHELORS OF MECHANICAL ENGINEERING.

John Fowler, Philadelphia.—"The Storing and Distributing Gasometer."

Wm. D. Hewitt, Burlington, N. J.—"Casting and Founding."

BACHELORS OF CIVIL ENGINEERING.

Charles Allmendinger, Philadelphia.—"Roof Constructions."

W. Clarence Cranmer, Port Richmond, Pa.—"Canal Locks."

Henry H. Corson, Plymouth Meeting P. O., Pa.—"Wooden Truss Railroad Bridges."

Narcisse R. Dennis, Chester, Pa.—"Land Drainage."

George U. Engle, Philadelphia.—"The Preservation of Timber."

J. Pemberton Hutchinson, Newtown, Pa —"Artesian Wells."

Percival B. Heilner, Pottsville, Pa.—"The Breaking, Screening and Purification of Coal."

William Johnson, Brandywine Manor, Pa.—"The Ballast and Sleepers of Railroads."

Samuel B. Judah, Vincennes, Ind.—"Piling Foundations."

John R. Jones, Conshohocken, Pa.—"The Aqueduct."

Benjamin C. Reeve, Allowaystown, N. J.—"Bridge Foundations."

Prospero B. Romen, Santiago de Cuba.—"The Iron Rail; its Manufacture, Weight and Proportions."

Wm. G. Smyser, Norristown, Pa.—"The Common Road."

Henry C. Thompson, Philadelphia.—"City Drainage."

The Master's Degree in Course was conferred upon the following Bachelors of four years' standing:—

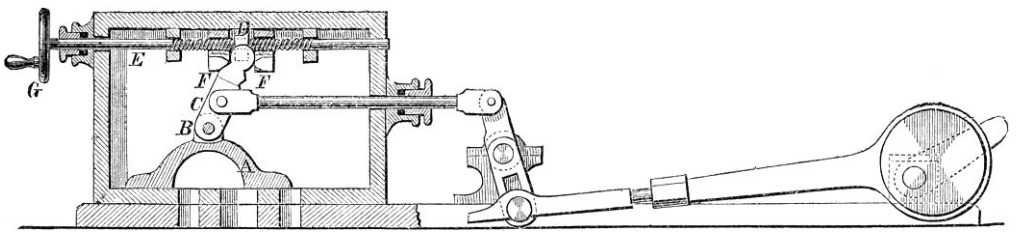
Master of Mechanical Engineering—Lewis W. Robinson, Assistant Engineer U. S. N.

Master of Civil Engineering—Joseph B. Hutchinson, Division Engineer Western Pennsylvania Railroad.

Improved Slide Valve Movement.

The improvement herewith illustrated was patented through the Scientific American Patent Agency by John B. Cochran, of Brooklyn, N. Y., May 30, 1865.

It is claimed for this invention that the steam may be cut off at any point of the stroke desired without altering the lead. To effect this object the inventor provides the valve, A, with a lug, B, to which is attached a lever, C. This lever is jointed at the top to a collar, D, which slides on the rod, E. There are on this rod two nuts, F, which have right and left-hand threads to correspond with those on the stem, so that when the hand wheel, G, is turned, the nuts will be spread open or drawn together. These nuts constitute a stop-motion, for when (says the inventor) the nuts are close together—as in the engravings—the valve will travel full stroke, but by throwing the nuts apart the collar will first slide on the rod until it meets the stop nut, and will then be checked in its motion and move the main valve, A, in a less degree, or a distance corresponding to the distance of the nuts from each other and the length of the levers. By varying the spread of the nuts it is claimed that a simple and efficient device for working steam expansively is obtained.



COCHRAN'S SLIDE VALVE MOVEMENT.

The owner of the patent is desirous to dispose of the whole right, or he will sell, upon reasonable terms, State rights. For further particulars address George G. Cochran, corner of Atlantic street and 4th avenue, Brookiyn, N. Y.

A Dangerous Invention Brought to Light.

The following letter was sent to us by the private secretary of Governor Pierpont, of Virginia, who remarks that it was found among the private papers of ex-Governor Letcher shortly after the evacuation of Richmond. As "genius cannot thrive in fetters," so, consequently, "the combined atmospheric pressure and lever power" was not arrayed against the Government:—

"I notice in the Richmond *Enquirer* some one desires inventions that might be useful in repelling our enemy. I have a plan, which is to have a concealed lever which will move at the proper time, by the tread of the enemy, and which will spring a number of triggers that will set off as many bombs; also cannon, sealed water-proof, and set in rivers and bays. Vessels passing over them set them off, and are thereby destroyed. If you think my plan would be of any use, let me know. If I had money sufficient I would come down and show the mechanics how to do the work. I think my plan may be useful. I wish to do all I can for the safety of our country and make the path of the enemy a rough one. I have a plan for bringing atmospheric pressure and lever power combined to propel machinery. I am confident this will work equal to any power. If I can get the chance to come to Richmond and get the model made, and, if successful in this, I could have cars so constructed that we could run right in among the enemy and make tremendous havoc among them, and not be harmed by balls. This should be kept a secret. I wish to get a patent for it. As I put confidence in you two gentlemen, if you think any of my plans will be useful, either or each of you can write to me and let me know what you think of it.

"Respectfully, "THOMAS M. LEE.

"To Governor Letcher and President Davis."

Effect of Lightning.

Dr. Boudin, says the *Mechanics' Magazine*, has sent a note to the Academy of Sciences on the fulminating power of bodies recently struck by lightning, and of which he adduces two remarkable instances. On the 30th of June 1854, a man was killed by lightning near the Garden of Plants at Paris; the body remained for some time exposed to a pouring rain. After the storm two soldiers, in attempting to lift up the body, received two violent shocks. In the other case, which occurred at Zara, Dalmatia, two artillerymen who had been ordered to set up again in their former places two telegraphic posts that had been thrown down during a storm; took hold of the telegraphic wire. Although it was two hours after the storm, there was so much electricity left that the men first experienced a few slight shocks, and then were both thrown to the ground. The hands of both were scorched, and one of them did not even for a time show any signs of life. The other, in attempting to get up, sank down again, and in so doing touched a comrade, who was coming to his assistance, with his elbow. The third man was then thrown down in his turn, experienced various nervous effects, and his arm was marked with a burn at the spot where he had been touched by the other man's elbow.

Mountain Railways.

Pending the completion of the tunnel of seven and a half miles through Mont Cenis, and which—as more than four and a half miles remain to be pierced—will yet require seven or eight years, Messrs. Brassey have taken steps toward the construction of a railway over the mountain, to supply the break of forty-seven miles now existing between St. Michel and Susa, in the line of communication between France and Italy. An experimental line has been already constructed on the French side, between Lanslebourg and the summit, a distance of a mile and a quarter. Capt. Tyler reports officially to the Board of Trade that this experimental line possesses a mean gradient of one in thirteen, and a maximum of one in twelve. It passes round a sharp corner, joining two of the zigzags of ascent on a curve with about two chains radius, and was purposely constructed on the most difficult portion of the route. Horizontal driving wheels act on a middle rail. The importance of these results to the future of railway construction in mountainous countries can, therefore, hardly be overestimated. Capt. Tyler says the railway will be safer than the road.

Hints to Purchasers of Precious Stones.

There are in practice, we fancy, only three rules worth much to the unskilled public when in search of really good stones. These are, first, never to buy of a jeweler, but always unset stones of a lapidary who deals in nothing else. He will give you an indefinitely larger choice at an indefinitely lower price, and as you can really see an unset stone, you have at least the advantage of your eyes, which you have not when the stone is crusted up with what it pleases some jewelers to call gold. Second, buy no stone of any value without a written statement of its weight, verified before the purchaser's eyes; and third, recollect that all stones except the finest diamonds and rubies are cheaper than the popular impression of their price, and that the inferior stones—beryls, topazes, amethysts, turquoises, garnets and onyxs—are comparitively cheap indeed, being produced in quantities which render enormous prices simply waste of money.—*London Spectator.*

Correspondence

The Navy Controversy--Letter from Mr. Dickerson.

MESSRS. EDITORS:- Your paper of the 12th inst. contains a letter on the subject of the *Algonquin*, dated at Washington, and signed "Justitia," which evidently is inspired by high authority, and therefore deserves notice. Who is "Justitia?" Is it Capt. Fox, or Mr. Isherwood, or some of the contractors or engineers? Why does not "Justitia" give the public his real name when he appeals to the public, so that the public may judge for themselves, whether the assumed title means justice, or only an attempt to *avoid justice?* But whoever he is, he evidently has the official sanction and access to the department records; for he quotes the contract, of which but two copies exist, one on file and one in my hands; and it is a fair inference that he makes the best defense of the department that it knows how to plead.

"Justitia" says that the contract requires the power to be ascertained by the "usual tests;" and he declares that "the *usual tests* are the measurement of the power by means of the well-known indicator employed the world over for this purpose, and the weighing of the coal"—the trial to be made at the dock. It is a pity that the Navy Department did not think of this method earlier. Capt. Fox *at first* ordered the *Algonquin* to be run in the North River, against the affidavit of John Baird, and had her partly filled with coal the next working day after her arrival here, for the purpose of that trial. The unanimous denunciation of the press and of the public arrested him in his scheme; and he now discovers that a *trial at the dock, with indicators,* is the one provided for in the contract; and now the people's money must be spent in unloading the coal and hiring a dock, when a run on the river would cost nothing.

"Justitia," however, makes one true statement, to which I propose to hold the department. He says that when the wheels on both vessels are the same, and dip the same in the water, they will *"themselves become a perfect dynamometer;* and if they be revolved faster by one engine than the other, that engine *unquestionably* developes the most power." That is true exactly! But the department won't submit to this *"perfect dynamometer;"* they insist on the combination of an *indicator* diagram, with John Baird or Isherwood to make the calculations, as the only "perfect dynamometer" which would give them any show of success; and to that combination I don't propose to submit, to the best of my present knowledge, information and belief. I am now in correspondence with Rear-Admiral Gregory to settle the terms of the trial, and I will give the public the correspondence when it is matured.

"Justitia" overwhelms me with the announcement that the Navy Department "has no correspondence with *me;* and has nothing whatever to do with *me.*" This is not generous in "Justitia." Surely it is misfortune enough to have fallen under the displeasure of three such exalted beings as Secretary Welles, Assistant-Secretary Fox, and Engineer-in-Chief Isherwood, without being reproached with the calamity. A magnanimous man never exults over an unfortunate foe.

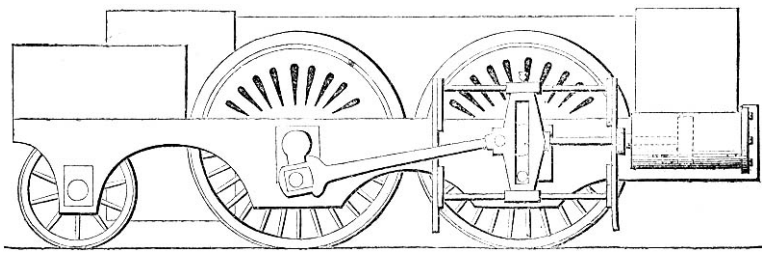
But "Justitia" is mistaken in his facts. The Navy Department *has* had *something* "to do with me." They issued a libelous pamphlet against me, containing twenty-two engraved caricatures, and forty-five pages of print, holding me up to ridicule, because I will continue to believe that James Watt, Marriotte and Regnault, knew more about the laws of steam than was learned by a *newspaper reporter* in an experiment tried on an old engine tied fast to the dock in Lake Erie—where the trick of proving that there is *no benefit in expansion,* by tying up to the dock, was first learned. This libel was distributed extensively from the Navy Department, and franked through the post-office as *official business.* I have a copy of it in the original envelope, sent by mail, with the Navy Department's frank as *official business,* and with the compliments of G. V. Fox, written in it by himself. That distinguished statesman and patriot kept a large pile of these libels in the office which he adorns by his presence, and distributed them to all persons whose business required them to visit that dignified place, to the great disgust of many gentlemen, and to the great delight of those whose happiness it is to picture to us the proclivity of democracies, and the certain failure of our form of government. Yours, &c.

EDWARD N. DICKERSON.

The Slotted Yoke Connection.

MESSRS. EDITORS:—Though not a professional engineer, I nevertheless take a great interest in all matters relating to machinery—steam engines more particularly—and I am a constant reader of the SCIENTIFIC AMERICAN, which capital paper has a great many admirers, also, in Germany. I have had some business about steam fire-engines of late; several American specimens have been brought over to this country which were built by the Amoskeag Manufacturing Company, Manchester N. H. These engines are constructed after Carett's steam-pump system. [This is erroneous. Lee & Larned's have *Carey's* rotary pump.—EDS.] I often admired the ingenious device therein adopted for directly transferring the to-and-fro motion of the piston rod to the crank shaft of the fly-wheel without connecting rods or guide boxes.

Some time ago I made a small model of a locomotive engine with two pairs of coupled driving wheels,



and the idea struck me to try the above-mentioned system for one pair of the wheels in place of the usual two connecting rods used in these cases. The illustration will speak for itself and show the manner how the thing was done.

This model worked very nicely; but what I should like to know is, whether you believe this arrangement to be practicable for large locomotive engines, and whether it offers some advantage over the coupling system now generally used?

At all events, space, friction and material may be saved by this transmission. I should almost think this plan to be an old friend altogether, though I never read about it in mechanical periodicals, so that it may be a new thing after all. But again, on the other hand, who could read and learn everything new brought out in machinery?

What do you think about this novelty? Perhaps even such a thing as a patent might be procured on it.

Do you think a substitute for sulphuric ether, in photographic collodion, might be found? A great many photographers suffer with nervous debility caused by constantly inhaling its highly oppressive vapors. I think the substitute in question would be a fortune to the successful discoverer.

CH. LINDT.

No. 25 Ecchersheimer Chaussee, Frankfort-on-the-Main, Germany July 14, 1865.

[The slotted yoke connection is one of the oldest devices for converting reciprocating into rotary motion, and is only available on short strokes and small cylinders. The strain of the crank in rotation is so violent and unequally distributed—first at the top and then at the bottom—that it requires the piston rod to be unusually heavy to resist its action. The box must also have more or less play to allow it to pass the center, and it soon wears so that it thumps badly. All the evils of a short connecting rod are concentrated and condensed in this arrangement. For a locomotive it would be wholly impracticable. The hint about collodion is worth attending to, but much attention has been given to it already.—EDS.

Economy in The Use of Oils.

MESSRS. EDITORS:—My attention has been called to a somewhat important subject, viz: whether the shape and size of chimneys and founts regulate the amount of oil consumed in a given time. It has been noticed in our household that in the case of two lamps—kerosene—with the same sized fount and burner, but different-sized chimneys, one had to be filled oftener than the other; the one with the small chimney twice to the one with large chimney three times—both burning the same number of hours.

No doubt some of your intelligent readers can answer, and others will, by experiments, try to solve the question; and to them allow me to submit the following for solution:

First, Whether chimneys, large and small, tend to increase or diminish the consumption of oil, time of burning-fount, and burner being equal?

Second, How long will a quart of oil last, burned in the most economical way, in an "A" or "B" burner? The answers made public through your highly appreciated organ would be desirable.

ADOLPHUS BENEDICT.

Williamsburg, L. I., July 26, 1865.

Wire Cloth for Bolts.

MESSRS. EDITORS:—You recollect I wrote to you several years ago for information about the most improved plan to cover a set of reels for a merchant mill; and also what to do to keep the bugs from eating holes in the cloths. I have since obtained the information, and now send it to you for the benefit of all whom it may concern, and particularly that of John H. Teahl, Cumberland Valley Mills. I would say, cover with wire cloth. We use it on a grist reel, and it works well; and on it Mister Bug can only stop to whet his bill.

Where wire is used the reels need not be so long by one-third, and for bolting meal made from damp wheat it is far preferable to cloth. Wire is now manufactured to suit all numbers and sizes, ranging from No. 2 to No. 60. Iron-wire cloth and brass from No. 2 to 70, and may be higher, for all I know. No. 60 iron-wire cloth is fine enough for superfine flour, and No. 30 for corn meal. All descriptions of wire can be obtained at the manufactory of Sterling Smith, No. 29 Fulton street, New York. His prices in peace times vary from 12½ cents per square foot to 45 cents, for iron, and 30 to 80 cents for brass. I am not able to say what the war prices are. I think we shall use it on our merchant reels when they want re-covering.

Now I will ask a question. How does wire cloth compare in number with the old Dutch cloths now in use? Is No. 60 wire equal to No. 10 cloth? And in what way do they run? Will some of our wire manufacturers send me a number as high as now made, with the prices and the widths?

If any person has had any experience with wire-bolting cloths, I should be pleased to hear from him.

G. W. WASKEY

Springfield, Ohio, August 7, 1865.

Molds for Casting Iron Pipes.

MESSRS. EDITORS:—Observing in a recent issue that you notice as new the application of centrifugal force to the casting of iron pipe or tubes, said to have been invented by M. Auguste Larden, an employee at the iron works of the Messrs. Holmberg & Co., at Lund, Sweden, you will oblige me by calling attention to the fact that this principle was patented by Mr. Thomas J. Lovegrove, of the City of Baltimore, in the year 1849, as by reference to patent No. 5,988, of that year, will appear.

Let me further add, that tubes of iron, lead, copper, glass, etc., were manufactured at Canton, near the City of Baltimore during the years 1851-52.

New York, Aug. 5, 1865.

[There are many things patented in England which have been used a long time in this country.—EDS.

To Draw a Cork without a Corkscrew.

MESSRS. EDITORS:—To draw corks from bottles without injury to the cork and without the aid of any instrument, grasp the bottle in the hand and strike it squarely upon any firm place, right side up, with such force as it will bear without danger of breaking. A few blows will extract any ordinary cork, whether the bottle be full or only partially so. What is the true explanation of this?

GEO. T. MCLAUTHLIN.

Boston, Mass., Aug. 7, 1865.

Why Mountains are Colder than Valleys.

MESSRS. EDITORS:—The fact that the upper regions of the atmosphere are colder than the lower is generally ascribed to two causes. First, terrestrial volcanic heat communicated to the lower strata of air by contact; second, the conversion of some portion of the solar rays into heat by their passage through the atmosphere.

The theory of the convertibility of forces—now pretty well established—does not admit of the latter explanation. According to this theory, light considered as a force, in its passage through a perfectly transparent body—such as the pure atmospheric air nearly is—produces no change or phenomenon whatever; but whenever any portion of the light is absorbed or retained by the body on which it falls, the force is not destroyed, but changed into some other form, generally—and especially in the case of sunlight—producing heat. Hence, but very little heat can be gained from the solar rays on their transmission through clear air, as very little light is lost in the same; and whatever heat the air possesses must chiefly be obtained from another source than radiation. This source is contact with terrestrial objects. These latter are all to some extent absorbents of light, that is, opaque bodies. The absorbed light is transmitted into heat, and thence communicated to the nearest strata of the atmosphere, *i. e.*, the lowest. Hence these are warmer.

The principle at the bottom of this theory can be tested by any one. Let a pane of glass in your window be clean and hence transparent, and another pane dirty, and hence semi-opaque. Both being exposed to an afternoon's sun, the clean pane will be very appreciably colder than the other. Again, on a clear, "blue" summer's noon let a breeze stir, and it will feel remarkably cooler than one of the same strength and direction when the air is charged with moisture, and the sky dingy. This has been proved with an air thermometer. Hence the fomer kind of weather is simply called hot, while the latter is "sultry." In the one case, the transparent body lets all the light, or very nearly all, pass; in the other, the partially opaque body allowed a portion of light to pass and changed the rest into heat.

G. MEULLER.

New York, August 5, 1865.

[We should suppose the principal reason why moist is more sultry than dry air is, that the vapor of water transmits heat more slowly than air. This fact was very fully established by Tyndall. Absorption of heat by terrestrial objects is doubtless one cause of the higher temperature of low altitudes, but we doubt whether the conversion of light into heat plays any important part in this result.—EDS.

The Way Tubes for Artist's Colors are Made.

MESSRS. EDITORS:—As a recent number of the SCIENTIFIC AMERICAN indicates a desire on the part of a subscriber to obtain information respecting the process of manufacturing the small tin tubes used for artists colors and a variety of other purposes, I have forwarded the following description of the process as carried out in England under Rand's Patent, and called "Rand's Patent Collapsible Tubes."

"These thin tubes are closed at the one end by a convex disk with a projecting screw; the screw being perforated for the expulsion of artist's colors or other matters inclosed in the vessels. They were first drawn as tubes and the ends cast and soldered in, but the entire vessel is now made by only two blows, in dies of appropriate kinds. By one blow of a screw press, a thick circular disk of tin of the external diameter of the intended vessel is punched out, made concave, and perforated with a central hole, somewhat like a washer for machinery. By a second blow, the blank or button is converted into the finished tube. The bottom tool is a mold with a shallow cylindrical cavity of the same diameter as the button of tin, and terminating in a hollow screw The upper tool is a cylinder exceeding the length of the tube, and with a small taper spindle of the diameter of the hole. The cylinder is just so much smaller than the mold as to leave an annular space equal to the intended thickness of the tube. The very soft, ductile tin, when submitted to great pressure in the concentrated space within the mold, follows the laws of liquids, and may be said literally to flow through the annular crevice, and up the cylindrical mandrel; as indeed the formation of the tube appears to be instantaneous, and is a beautiful example, both of true principle and accurate workmanship, in the means employed.

The tube is released from the mold, first, by the ascent of the cylinder, which leaves the tube behind; and the screwed extremity of the mold is then driven up by a cam and lever from below, and the screwed dies, being divided on their diameter, instantly fall away from the vessel thus elegantly produced by a mode which was only attained after repeated variations in the process, respectively secured by patents. Small tubes are thus made in screw presses, and large tubes in hydrostatic presses of proportionate strength."

The above description is at your service if of any value. ABEL S. CHAPPELL.

Brooklyn, Aug. 10, 1865.

Velocities.

MESSRS. EDITORS:—Under the above title, in a late number of your valuable paper, I noticed an article signed "X," in which I find the following statement:—

"A cannon ball, fired perpendicularly, ascends with decreasing but falls with increasing velocity, and describes each portion of its path upward and downward, respectively in identically the same period of time."

May I be allowed to ask your correspondent "X" how he has ascertained this fact? And whether the size of the ball or weight of metal and the hight at which it is fired, has any thing to do with it? Why should not the same law apply to small rifle balls or even the common bird-shot, say No. 4? This fact I have proved many times—that No. 4 shot may be fired from a gun with sufficient force to go through an inch board at fifty feet, and yet this shot may be fired perpendicularly and allowed to ascend as high as it will, and on its return will fall harmless upon the bare hand. C.

Waltham, Mass., July 31, 1865.

[The law applies only to bodies rising and falling in a vacuum. The resistance of the air diminishes the velocity both of the ascent and of the descent, and this resistance is greater in proportion to the weight in the case of small balls than in that of large ones.—EDS.

A New Plan for Preparing Bird Skins.

MESSRS. EDITORS:—In your last paper I saw an article about skinning and stuffing birds. I have found myself that it is a tedious and often difficult job so to stuff them that they look life-like, and I, therefore, tried another plan, which succeeds very well. I do not skin the birds at all, but make only an opening in the lower part of the body, remove all the intestines and insert in the empty space cotton, impregnated with a mixture of one part of creosote, three parts of alcohol, and one-quarter part arsenic acid; a wire, wrapped in cotton, saturated as before, goes through the neck. After sewing the opening up I lay the bird on its back for about two weeks, when it is fit to be set up. The flesh dries up like ham, without any perceptible shrinking, and the bird retains its original shape. The largest bird tried was a duck, but I think it might do with any size. To drive the disagreeable smell of the creosote away, I put the birds, after drying, in a baking oven when it is not too hot. I hope some of your readers may try this method and let us know the result.

GUSTAVUS H. SCHMIDT.

Swatara, August 6, 1865

To Glue Manufacturers.

MESSRS. EDITORS:—I have perused with much pleasure an article in a late number of your valuable journal, on the manufacture of glue, which, however, appears to me, to relate to the art as practiced in England. Will not some of your numerous readers, practically familiar with the subject, give us an exhaustive account of this art, as conducted here, and of its kindred branches? G. L.

New York, Aug. 12, 1865.

A Mechanical Problem.

MESSRS. EDITORS:—I propose to submit a question in dispute between some of our Western mechanics for your decision. Suppose a wheel, traveling on the ground, having an inside rim containing cogs—for instance the main wheel of a reaping machine—and suppose there is attached two pinions of an equal number of cogs—one at the top and the other at the bottom of the main wheel—which one of the pinions will make the greatest number of revolutions in traveling a certain distance; or is there no difference in their motion?

A. TEMPLE.

New Salem, Ill., Aug. 6, 1865.

[There is no difference.—EDS.

A Philosophical Problem.

MESSRS. EDITORS:—Quite a dispute has arisen between the mechanics of this place and myself in relation to the amount of force or power required to move a body at different distances from it. Thus, if a body or weight to be moved is placed two feet from the motive power, less power will be required to move it than when placed twenty feet off. So say the mechanics. I say, deduct the extra weight of chain, belt or pole, or whatever connects the weight to the power, and no extra force will be required to move the weight at twenty feet off. As we cannot settle the point ourselves, we have agreed to refer it to you for a decision.

THOS. J. CORNELL.

Decatur, Ill., July 28, 1865.

[We agree with you exactly.—EDS.

To Restore The Hair.

MESSRS. EDITORS:—I am a machinist and have worked under an iron roof for several years, from the effect of which I have lost a great deal of my hair. If you know of anything that will make the hair grow on my head again please let me know.

W. J. SMITH.

Reading, Pa., Aug. 4, 1865.

[We really sympathize with our correspondent, but we do not know of any article that we can sincerely recommend to promote the growth of his hair. The nostrums advertised for this purpose are generally good for nothing. We advise our correspondent to wash his head every morning and evening with castile soap water, and give the head a thorough rubbing with a linen towel. We have heard this process recommended. It can do no harm.—EDS.

A Tool Below the Centers.

MESSRS. EDITORS:—Will you please answer the following questions:—Can a straight or true taper be turned by a common engine lathe when the point of the tool stands above or below the centers? If not, why? D. ARTH. BROWN.

Fisherville, N. H., July 31, 1865.

[There is no reason why a true taper should not be turned when the tool is above or below the centers. Not one tool in a hundred coincides with the centers, but no difficulty is found in making a perfect fit.—EDS.

Fence-makers, Take Notice.

MESSRS. EDITORS:—Will you, through the columns of your valuable journal, call attention to the fact that there is now in this State a great field open to the manufacturers of field fence. Thousands of miles of fences have been consumed by the armies during the war. Water power is plenty and timber very cheap. To the inventor or manufacturer of the cheapest and best fence a fortune is in store for him in this State. E. A. DAYTON.

Alexandria, Va., July 28, 1865.

A Startling Announcement.

MESSRS. EDITORS:—It may please you to print the following item of news for the benefit of your readers. I have discovered the origin of gravitation.

WM. ISAACS LOOMIS,
Pastor of Baptist Church.

Martindale Depot, N. Y., July 25, 1865.

[This is the same gentleman who made the discovery that Sir Isaac Newton had made a mistake in regard to the precession of the equinoxes.—EDS.

Fruit Drier.

MESSRS. EDITORS:—If some one who is posted in such matters, will give through the columns of your paper the best plan of a house for fruit-drying many of your Western readers will be much obliged.

W. D. MAYFIELD.

Ashley, Ill., July, 1865

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Let-off Motion for Looms.—This invention consists in the combination with the mechanism which holds the yarn beam and prevents it from turning spontaneously, of a weight suspended from a sheave which rests in a bight of the warp in such a manner that, by the action of said weight against the mechanism which holds the yarn beam, the warp is set at liberty whenever the loom requires it, and, at the same time, by the weight, all the slack in the warp is taken up and allowed to pass to the loom, as required. The friction consists of a concave conical socket or seat, in the end of the warp beam, in combination with a conical plug, sliding on the axle of the said warp beam, and connected to the lever, which is acted upon by the weight, as above stated, in such a manner that when said lever is left to follow its own inherent gravity, assisted by the action of spiral springs, the conical plug is pressed into the conical seat with sufficient force to hold the warp beam stationary, but, as soon as the lever is raised, the warp beam is released, and a portion of the warp is let off. W. W. Pomeroy, East Hampton, Mass., is the inventor.

Breech-loading Fire-arm.—This invention consists in the employment or use of a fixed metallic cartridge case, fastened in the breech block or cylinder, and moved with the same, in such a manner that it enters a short distance into the rear end of the barrel, and prevents windage between the same and the breech block or cylinder; also, in the application of a chamfered sleeve inserted into the face of the breech block or cylinder, and applied in combination with the same, and with the metallic cartridge case, in such a manner that by the action of said chamfered sleeve the cartridge case is guided and held central with the bore of the barrel. The invention consists further in combining with the guard bow two arms or levers—one intended to act on the slotted tail of the oscillating locking wedge, and the other to act on a slot in the rear end of the breech block, in such a manner that by the action of said guard bow the locking wedge is turned up and the breech block made to slide back and turn up to a position convenient for receiving a new charge, or for removing the empty cartridge cases when fixed ammunition is used. W. F. Wilson and Henry Flather, of Bridesburg, Pa., are the inventors.

Spring Punch.—This invention relates to a tool for punching holes of different sizes into leather, paper or any other substance or material of a similar nature, and for inserting and heading eyelets. The punches are secured in a head, which revolves between the two arms or prongs of one of the jaws of a pair of nippers, on a pivot which has a firm bracing on both sides of the punch-head, and which, at the same time, forms a guide for the spring catch, that serves to retain said head in the desired position. The other jaw carries a block or anvil, which is secured to it by a thumb-screw, so that it can be revolved and set in any desired position. It is provided with several faces, one of which is covered with sheet brass or other soft metal, to be used for punching, while the other faces are provided with holds and recesses, to correspond to the pins and faces of the heading tools. Peter Bauer, Newark, N. J., is the inventor.

Cabinet Organ.—This invention consists in applying porous or perforated material, or woven fabrics, which can be penetrated by air, to the safety-valve of a musical instrument, or to any other aperture for the passage of air, so as to divide the mass or current of air into many parts, and thereby prevent noise from the passage or movement of the air, and also restrain and modify the rapidity and energy of its passage. George Woods, of Cambridge, Mass., is the inventor.

Gas-fitter's Clamp or Wrench.—The object of this invention is to provide a gas-fitter's clamp, adjustable to all sizes of plates, whether large or small, within any reasonable limits, and with facility, ease and quickness. It consists in forming the clamp of two shafts, one of which has its outer end made of a hook shape, at a short distance from, and between which and its handle, is a short slot extending in the direction of its length, having its end toward the handle serrated, or made of a toothed shape, in and through which slot the other shaft is inserted, made of such a size as to be freely moved forward and backward therein, with its edge, which comes in contact with the teeth of the slot, correspondingly toothed or serrated, so that, having first placed the hook-shaped end about and around the pipe upon which it is intended to operate, and then having adjusted the outer end of the other shaft, so as to bear against said pipe, by simply grasping the handle ends of the two shafts with the hands, and moving them toward each other, the outer end of the adjustable shaft can be made to tightly hold and grasp the pipe; the interlocking of its teeth with the toothed slot preventing it from slipping, and serving also as a fulcrum for the same to turn upon. Andrew B. Lipsey, of No. 17 Broadway, New York, is the inventor.

Machine for Pressing Brick.—This invention consists in the employment of a horizontal rotating disk or table, provided with cavities, which form the brick molds, and having plungers or followers fitted within them, which are operated by inclined surfaces on an annular track or way. The cavities or molds in the disk or table are provided with hinged lids or covers, and an adjustable bearing is placed over the lids or covers, to keep them firmly down, while the plungers or followers are compressing the clay in the cavities or molds. E. P. H. Capron, of Springfield, Ohio, is the inventor.

BREAKING OF THE ATLANTIC CABLE.

From Mr. Field's diary it seems that in the course of laying the cable, three times defects were discovered in the insulation after the injured part had left the ship; twice the cable was hauled back on board, and the injured part discovered and cut out; but in the third effort the cable caught in the hawse-hole and was badly chafed, and when this chafed portion came on board it parted, the outer end dropping down into the bottom of the sea. This occurred in a depth of 1,950 fathoms—more than two miles. But even in this great depth the cable was dragged for by a grapnel, was caught and raised 1,200 fathoms, when a shackle of the grapnel rope parted, and the cable fell back to the bottom of the ocean. In a second effort the cable was again seized and drawn up 900 fathoms, when the shackles broke and dropped the cable the second time to the bottom. The account of the third effort we give in Mr. Field's own words:—

THURSDAY, Aug. 10.

At 7 o'clock A. M. we began to lower the grapnel, and at 8:55 had out 2,460 fathoms—all that was on board the ships—and commenced dragging for the cable, and continued to do so, until the evening, when we began to haul in slowly.

FRIDAY, Aug. 11.

At 6 A. M. we finished hauling in the 2,460 fathoms of rope, when the grapnel came up foul with its own chain.

At 11 A. M. we began to lower the grapnel again, and as soon as all the 2,460 fathoms were paid out we commenced dragging until 3:55 P. M., when we began to haul in slowly.

It was soon evident by the great strain that the grapnel had caught the cable.

At 7 P. M., when 710 fathoms had been recovered, the rope parted.

As there was not sufficient rope on board the *Great Eastern* to resume grapneling, it was decided that she should return at once to England.

MISCELLANEOUS SUMMARY.

N. C. THOMPSON, of Woodstock, Vt., has lately introduced steam as a substitute for hand labor, at his marble works, for the polishing of the stone, gaining by its use a vast saving of time and strength. Large quantities of Vermont marble are annually used at Mr. Thompson's establishment, and also of New Hampshire granite. The Vermont quarries are principally at Rutland and Dorset.

IT is reported that the Wisconsin river is a perfect mass of sawed lumber. Millions of feet are lying there with no immediate prospect of getting out, and the lumbermen feel discouraged, and talk of avoiding the trouble hereafter by artifical help, such as making slack-water improvements.

MOST persons who have crossed Westminster Bridge of late have doubtless observed the new system of guttering recently laid down. The gutter is of cast iron, about 9 in. wide, and has a raised edge some 3 in. high, which divides it from the road. In this ridge, holes are left at intervals for the surface water from the road to pass through. But such has been the foresight of the engineer, that at the very times when its use is required it is inoperative. This arises from the wheels of vehicles filling up the holes with mud as neatly as a druggist fills his pot with salve. So that, after several hundred pounds have been spent, attendants are required to keep the passages clear with pickers!

AN INDIAN'S IDEA OF MACHINERY.—Some chiefs of Canadian Indians, a few days ago, saw a Wheeler & Wilson's sewing machine in operation for the first time. One old chief, with a lamp, watched the motion beneath the table and the rest kept there eyes fixed upon it above, to see there were no "white lies" about it. They then compared notes, threw themselves on the floor and rolled about laughing and crowing out, in Indian, the "Sewing Spirit." They had no idea it was the spirit of man's intelligence which put it in such successful motion.

AMONG the most recent scientific discoveries in France may be mentioned a method invented by M. Neant for keeping afloat a vessel about to sink, and putting out any fires that may happen to break out on board. His plan is to attach a certain number of balloons made of india-rubber, and inflated with air, to the sides of the sinking vessel. M. Chattenmann proposes to render externally incombustible by white-washing the wood with chloride of lime. This, he thinks, would prevent the rapid propagation of the flames, and allow sufficient time to extinguish them.

THE following process of encaustic is given by M. Bocklin :—Moist plaster of paris is painted with water colors as usual. When the design is perfectly dry, it is painted over with a hot solution of wax and resin, and this coating is burnt in with a strong heat. The wax sinking in fixes the color, and gives together with its compound resin a solid transparent surface, which effectually protects the painting from injury by damp or dust, the colors at the same time, being greatly hightened and improved.

A NEW method of fastening brooches and other similar articles of use and ornament, is due to Mr. Blackham, a Birmingham manufacturer. The fastening of the brooch is relieved from undue pressure in any one part, and instead of a soldered joint, so liable to rupture, the hinge is formed by a coil of the metal of which the pin is made, and so acquires the necessary spring by fitting into a strong socket. The sharp end of the pin does not project over the body of the brooch, but is held secure within a projecting shield.

THE Lee Fire-arms Co. have established at Milwaukee a factory for making rifles. A large amount of excellent machinery has been put in, and some eighteen or twenty hands are now employed in the manufacture of guns and additional machinery. The number of hands will soon be considerably increased, The company has a contract with the Government for some of its guns, which will give it a good start in business.

MANUFACTURE OF MAGNESIUM COMMENCED.—The Boston *Commercial Bulletin* says:—"The American Magnesium Co., of this city, have just commenced the manufacture of magnesium from dolomite or magnesium limestone by the Sonstadt method, and are producing the metal, both crude and refined, in considerable quantities. We do not doubt but that, as in other matters, perseverence will conquer all obstacles and insure its success."

THE rotary steam rag-bleaching boiler in Crane's paper mill, at Dalton, N. H., exploded on the 31st ult. with great force, jamming a costly paper-making machine into a worthless mass. The entire damage cannot be less than $6,000 or $7,000. These accidents are not uncommon, and it would seem worth while to take steps to prevent them. Rags are bleached by steam at a presure of 60 or 70 nounds.

THE captain of a vessel now unloading in New London has a hive of bees which came on the vessel at City Point in May last. When in port the bees go ashore for food; when at sea he feeds them with molasses.

Improved Compression Faucet.

This faucet has the great merit of affording a large opening for the passage of fluids; much greater, in fact, than can be obtained in faucets of the common kind. It is simple in construction, and not liable to wear leaky, since the pressure of the fluid tends to make the faucet tighter, instead of forcing the valve or plug away from its seat, as in the common faucet; when once properly seated the valve in the faucet will always be tight.

The engravings represent a faucet in section and perspective. The section shows the valve, A, and its seat. This valve works in the chamber, B, which screws on to the body, C, of the faucet. The valve seat is of rubber, and is confined between the chamber and the body, C. The valve is operated by a key, D, as usual, but this key is cranked in the center, as at E, so that when the key is turned the crank will rise and push the valve off its seat, thus allowing the liquid to flow out. The key is packed at each end with a rubber washer, F. The engraving shows a five-eighth faucet, and, as may be seen by the proportions, the original is but little larger than this engraving. The pressure of the liquid on the valve always keeps it tight. For hot water a different substance, not liable to change, is employed for the seat. We consider it a valuable improvement.

A patent is now pending on this faucet through the Scientific American Patent Agency, by John Broughton. For further information address Messrs. Broughton & Oakman, No. 41 Centre street, New York.

Fig. 1.

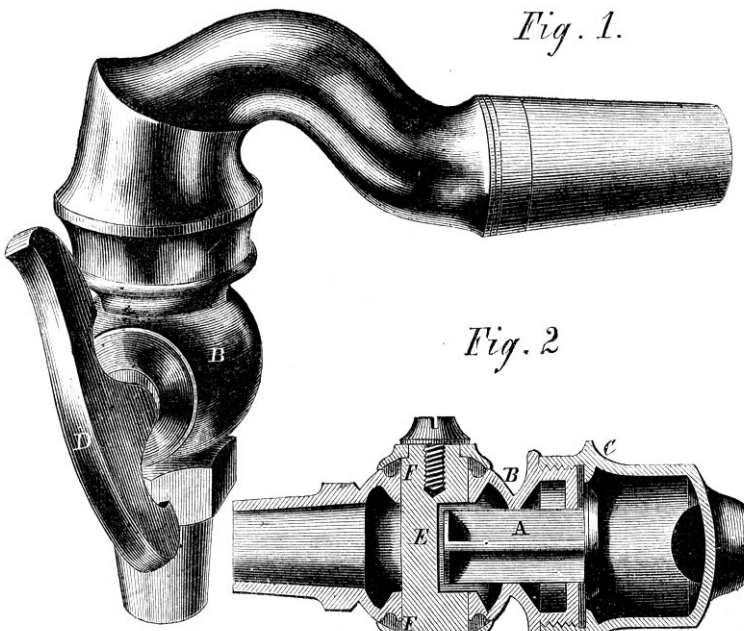
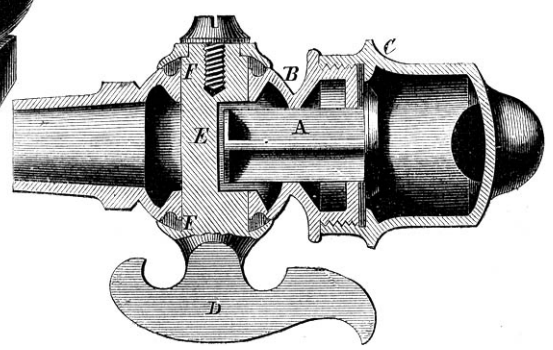


Fig. 2



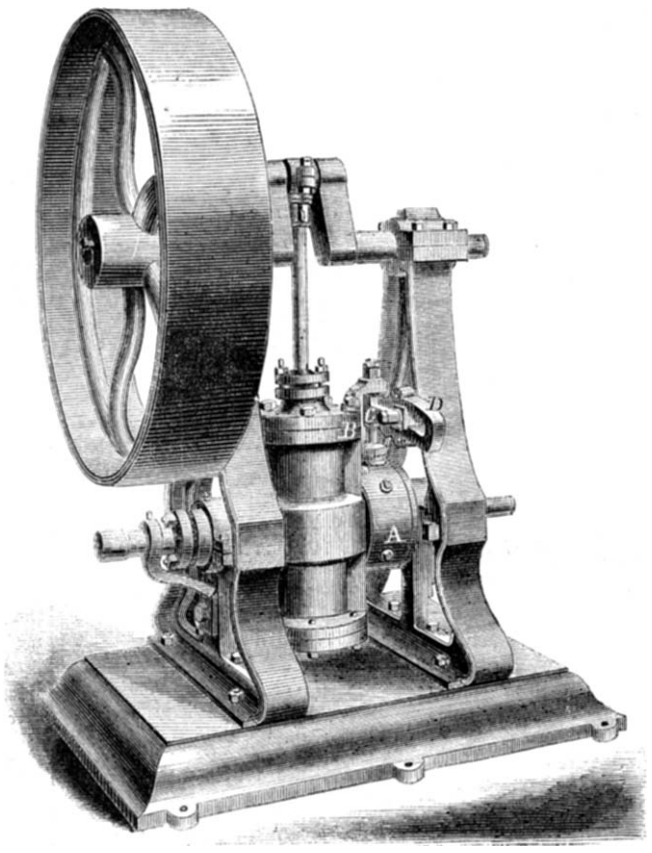
BROUGHTON'S COMPRESSION FAUCET.

Improved Oscillating Engine.

The annexed engraving represents one of Carter's ten-horse power oscillating steam engines. The advantages claimed for this invention are as follows:—It has a plain slide valve, working on a three-ported seat, inclosed in a steam chest; consequently there are no working joints, so common in some kinds of oscillating engines, to wear loose and leak, and no set screws required to keep the cylinder in position. The valve movement is simple, compact and durable.

In the engraving, A is the steam chest, and B the valve stem, which runs through the right-angled arm, C, and is made adjustable thereon by means of two nuts on the top and bottom of the arm. In the link, D, there is a composition box, which is connected to the arm, C, with a pin. When the cylinder oscillates it causes this arm, C, to travel in the stationary link, D, giving a reciprocating movement to the valve. This movement, the inventor says, is remarkably quick, and the engine starts from very near the center easily, without lead. The steam is let in and out through the trunnions, as usual, which are both of the same size. These engines are in successful operation, and prove entirely satisfactory.

It was patented through the Scientific American Patent Agency on July 25, 1865, by Henry T. Carter, of Portland, Maine, to whom all orders and communications must be addressed.



CARTER'S OSCILLATING ENGINE.

To Destroy Cockroaches.—Dr. Chabert, of Hoboken, has invented a first-rate remedy against cockroaches—this great plague of many of our households—which he offers to the public gratuitously. He simply pays a penny to his children for each cockroach they catch, dead or alive, a reward large enough to bring certain destruction to every straggler that may find his way into his dwelling.

[We get this statement from a correspondent; an easier plan would be to poison them.—Eds.

Cracking of Bells.

"Several years ago," says a traveler, "I paid a visit to the church at Hanbury, near Burton-on-Trent, and ascended the tower, in which a new setof bells had been recently hung. I was then informed that, on the completion of the restoration of the church, the workmen employed obtained permission to sound the bells in honor of the architect. One of them, by way of a practical joke, thinking to deaden the sound, suddenly clasped his arms around one of the bells at the moment when his comrade struck it. He succeeded beyond his wishes; for the bell cracked on receiving the blow, and had to be recast. On some suprise being expressed at this accident, the founder observed that a piece of packthread tied tightly round a bell would have produced the same result. The story made an impression on my mind at the time, and I am now glad that I remember it."

[Is this true?—Eds.

Unique Pocketbook.

A patent has been granted to Mr. J. T. Dubber for an improvement in pocketbooks which deserve, to be noticed by the readers of the Scientific American and the public in general. Every person using a pocketbook has probably experienced the difficulty that attaches to the ordinary fastenings, which consist either of catches or of elastic cords or straps; by these the closing flap is liable to open accidentally, often causing the loss of a portion or the whole of the contents of the pocketbook. This difficulty exists, particularly, if the pocketbook is opened for the purpose of taking out bills or papers from that part which is intended for holding such things. During this operation the pockets made to hold coin or fractional currency remain open and unprotected, and the contents thereof are liable to drop out and get lost. By Mr. Dubber's invention this difficulty is obviated, the closing flap being provided with a spring which holds the pocketbook, or any portion thereof, firmly closed, and the loss of the contents of the same is avoided. Further information in regard to manufacturers' licenses, or State or county rights, may be obtained by addressing the inventor, Mr. J. T. Dubber, 206 Broadway, New York.

Railway Grease.

When on a journey, and stopping at one of the larger stations, those passengers who do not care to go into the refreshment room have their attention riveted on the man with the yellow ointment very like pineapple ice cream. He gropes along by the side of the train, lifts up certain covers above the axles of the wheels, and at a glance sees whether the axle has sufficient lubricating food to last to the next principal station. If the axle is getting hungry, he digs a wooden knife into his grease box, takes up a tempting lump of cream, puts it into the axle box, shuts down the cover, and trots on to the next pair of wheels. It would be equally a mistake to suppose that this ointment is coarse in quality or small in quantity. The object in its use is to lubricate the rubbing surfaces of axles, in order to bring friction to a minimum —and a very nice adjustment of ingredients is necessary to insure that the substance shall produce the desired result without leaving any grit, and without being too hard in cold weather or too soft in warm. If we choose to touch a little of this ointment we shall find that it is beautifully smooth and uniform. It was only after many experiments that the right proportions of ingredients—tallow, palm oil, soda, resin, water, and possibly one or two others—were determined. Some of the companies buy their grease ready made; but the giants make their own in huge coppers. Into these steam is admitted from a boiler. The hot liquor (for the mixture is nearly liquid when hot) fizzes and bubbles and tosses about, until everything is thoroughly mixed with everything else. Then it is transferred to large flat wooden vessels, where it is stirred about while cooling. When cooled, it is shoveled into well-made barrels or casks, and these barrels are sent to all the principal stations, where the grease men administer the yellow food to the axle boxes. The substance is required by tuns weight every week on the longer lines of rail.—*All the Year Round.*

We would call the attention of capitalists seeking an investment to the India-rubber Works advertised in the back part of this number.

THE

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VOL. XIII. NO. 9...[NEW SERIES.].... *Twentieth Year.*

NEW YORK, SATURDAY, AUGUST 26, 1865.

Contents:

(Illustrations are indicated by an asterisk.)

*Kohly & Curtis's Evaporator. 127
The Oil Regions of Pennsylvania 128
A New Atmospheric Railway. 128
Water Tanks for Ships..... 128
Notes on New Discoveries and New Applications of Science 129
Puzzle Jugs..... 129
Interesting to Photographers. 129
Commencement of Polytechnic College of Pennsylvania..... 130
*Cochran's Slide Valve Movement..... 130
A Dangerous Invention Brought to Light..... 130
Effect of Lightning..... 130
Mountain Railroads. 130
Hints to Purchasers of Precious Stones..... 130
The Navy Controversy—Letter from Mr. Dickerson... 131
The Slotted Yoke Connection. 131
Economy in the Use of Oils... 131
Wire Cloth for Bolts..... 131
Molds for Casting Iron Pipes.. 131
To Draw a Cork Without a Cork Screw..... 131
Why Mountains are Colder than Valleys..... 132
The Way Tubes for Artists' Colors are Made..... 132
Velocities..... 132
A New Plan for Preparing Bird Skins..... 132
To Glue Manufacturers..... 132
A Mechanical Problem..... 132
A Philosophical Problem..... 132
To Restore the Hair..... 132
A Tool Below the Centers..... 132
Fence-makers, Take Notice... 132
A Startling Announcement... 132
Fruit Dryer..... 132
Recent American Patents..... 133
Breaking of the Atlantic Cable 133
Miscellaneous Summary..... 133
*Broughton's Compression Faucet..... 134
*Carter's Oscillating Engine.. 134
Cracking of Bells..... 134
Unique Pocketbook..... 134
Railway Grease..... 134
Twenty Years Ago—Volume I., Number 1..... 135
The Way the Distance Was Measured to the Fault in the Atlantic Cable..... 135
The Expansion Controversy.. 135
Patent Claims.....135, 137, 138, 139
Notes and Queries..... 140
*Ball's Snow Plow..... 142
Human Fallibility..... 142
A Novelty in Railroad Refreshments..... 142

TWENTY YEARS AGO.—VOLUME I., NUMBER 1.

On the 28th day of August, just twenty years ago, Rufus Porter issued to the public the first number of the SCIENTIFIC AMERICAN in a brief address, wherein he announced to the sovereign people that he should advocate the pure christian religion, without forming any particular sect, and should develop the beauties of nature which consists in the laws of mechanics, chemistry and other branches of natural philosophy, etc. The presen editors and proprietors assumed the control of the paper on July 30, 1846. It was then a good-sized folio of four pages—and in glancing over those pages we find some items that, seen in the light of the present day, are very curious and interesting; we give a few specimens:—

"*Morse's Telegraph.*—This wonder of the age, which has for several months past been in operation between Washington and Baltimore, appears likely to come into general use through the length and breadth of our land. Arrangements are already made for extending the lines to Philadelphia, New York, Albany, Buffalo, Springfield, Boston, and various other cities and sections. Hon. Amos Kendall, ex-Postmaster General, has taken the management of the invention—whether as proprietor or agent we are not informed—while the inventor is on a tour to Russia. We shall take an early opportunity to give our readers a full and minute description of this invention, with explanations and illustrations of its principles; but in consequence of the press and variety of matter which presses on this, our first number, we are constrained to defer it. We will add the remark, however, that it is contemplated by the merchants of our Western States to communicate their orders for goods, etc., by means of the telegraph, instead of abiding the slow and tedious progress of railroad cars."

"*The Steamship Great Britain.*—This mammoth of the ocean, which has recently arrived from Liverpool, has created much excitement here as well as in Europe, being, in fact, the greatest maritime curiosity ever seen in our harbor. She was built by the 'Great Western Steamship Company,' at Bristol, England. Her keel was laid in July, 1839, and she was launched in July, 1844, with her engines and machinery on board. She is composed entirely of iron, which renders her perfectly safe against accidents by fire." Then follows a statement of her dimensions.

"*Centrifugal Clarifier.*—Mr. Joseph Hurd, of Shoreham, Vt., has secured Letters Patent for an apparatus for separating or clarifying liquids by application of centrifugal force. It is a well-known fact that mucilage or sugar, as well as mineral and saline substances, have a greater specific gravity than water, though the particles thereof will not readily separate from water by mere force of gravity, but when a mixed fluid, or turbid water, is put into a violent rotary motion, in a cask or cylinder, the centrifugal force will drive the heavier particles to the sides of the vessel, while the clear water remains in the center."

"*Electro-magnetic Light.*—There is much talk about introducing electro-magnetic light, as a substitute for oil or gas; when we learn more about it we shall be free to communicate particulars."

Aerial Navigation.—There is a long description, illustrated by a cut, of a balloon for navigating the air, though different in form, precisely the same in principle, as that of Solomon Andrews, which is attracting so much attention at the present time. It was invented by Signor Mussi, an Italian, and was exhibited in this city to a "select and fashionable audience," at 50 cents a head. Mr. Porter, having an invention of his own for propelling a spindle-shaped balloon by means of screws driven by a steam engine, ridicules the plan of Signor Muzzi with great bitterness.

List of Patents.—A portion of one column is occupied with a list of the patents issued from the 1st of July to the 16th of August.

"*Electro Plating.*—This incomprehensible art, which has been in use about three years, is truly valuable, and must prevail extensively, notwithstanding the disadvantage to which its reputation has been subjected, in consequence of the many impositions practiced on the public by the unprincipled speculators. Having been the first to introduce this art in the city of New York, we have had opportunity for more experience in the business, probably, than any other person in the country; and can say with confidence, that either gold-plating or silvering can be executed by the electro process with greater beauty and permanence than can be done by the old process, yet at less than one-half the expense."

THE WAY THE DISTANCE WAS MEASURED TO THE FAULT IN THE ATLANTIC CABLE.

If a wire be laid upon a mariner's compass, in a position parallel with the needle, and a current of electricity be sent through it, the needle will turn from its north and south position, partly toward the east and west; the extent of the deviation depending upon the force of the current. If a second wire be laid under the compass, in a position parallel with the first, and a current be passed through it in the opposite direction, the needle will be deviated still more, and if a wire properly insulated be wound round the compass in a north and south direction, the deflecting force of a given current is in proportion to the number of convolutions. With a given number of convolutions the deflection bears a certain ascertained relation to the force of the current; the force being in proportion to the sine of the angle of deflection. Consequently a needle thus arranged constitutes an instrument by which the force of a galvanic current passing through the wire may be measured; it is therefore called a galvanometer.

The force of a galvanic current is diminished by its passage through a long circuit; the force of a given current being in inverse proportion to the length of the circuit. Hence, if we know the force and length of a given circuit, and it is then shortened or lengthened, we can ascertain its new length by measuring its force by a galvanometer.

While the cable was being laid, a current was frequently sent through it from the land in Ireland, a connection being made between the further end of the cable coiled in the ship and the water, so that the current went out by the wire and completed its circuit by the sea. Electricity always takes the shortest path, or rather the path which offers the least resistance, and when that part of the cable which had a bit of wire pricking through the gutta-percha to the conducting core entered the ocean, the current ceased to run its dizzy round through the miles of coil in the tanks of the *Great Eastern*, but, slipping out on the bit of wire, it cut straight back to the coast of Ireland. This shortening of the circuit increased the force of the current, which was immediately indicated by the galvanometer, the extent of the variation in the needle showing the distance at which the insulation was broken.

The most sensitive galvanometer is made by two needles, one slightly more powerful than the other, passed in a parallel position transversely through a straw, with their poles reversed, the directing force of the earth upon the the more powerful needle being nearly balanced by the same force acting in the opposite direction upon the other. The needles thus arranged are suspended under a glass receiver by a fiber of unspun silk, and the lower needle only is surrounded by the coil. It is said that in the galvanometer employed in laying the cable the indications of the deflections were multiplied by having the needles carry an exceedingly thin, light mirror, upon which a beam of light was thrown; the slightest change in the position of the needles was then made manifest by the movement of the reflected beam along the wall.

It is proper to state that this explanation is not given from definite knowledge of what was actually done at Valentia, but as an inference from the fact that the length of electric circuits may be measured in this way, and from a remark by the London *Times*, that the locality of the fault was found by resistance tests.

THE EXPANSION CONTROVERSY.

A personal controversy is something with which we will have nothing to do. An examination of the character and reputation of G. V. Fox and E. N. Dickerson, or of any other person, may be a suitable employment for political journals, but is out of place in the columns of a scientific paper. But, so far as this dispute has a bearing upon the vexed question of the most economical measure of expansion in working steam, it comes within our province. As this question, in consequence of the controversy, is now attracting general attention in the community, it may interest many of our readers, who are not engineers, to know what are the leading facts in relation to it.

If a cubic foot of air be suffered to expand to a volume of two cubic feet, and its temperature be kept constant, its pressure will be reduced one-half. The same law applies to all permanent gases, and this is the famous Mariotte law—half the volume, double the pressure. An essential condition is that the temperature be kept constant. Tyndall contends that when air expands, without doing any work, as when it expands into a vacuum, its temperature is not reduced by the expansion; but all physicists are agreed that if the air in expanding performs work—overcomes resistance—it is cooled, and, consequently, its pressure is reduced to less than that assigned by the law.

It was formerly taught in the books that steam expanded in accordance with the Mariotte law, but it was discovered many years ago that so large a portion of the steam is condensed into water as to cause a very wide departure from this law. What the amount of this condensation is—to what extent it balances the work theoretically due to expansion, and, consequently, whether there is economy in working steam through large measures of expansion—is a problem which has proved to be one of the most difficult of solution of any that has occupied the attention of philosophers.

One the 18th of November last, Professor W. J. Macquorn Rankine, of Glasgow University, in a communication to this paper, stated the law of the expansion of steam under five different conditions, concluding with the case of a steam engine, in these words:—

"When the steam expands and performs work in a conducting cylinder, which receives no supply of heat from without, but is left to undergo a great alternate rise and fall of temperature through its alternate connection with the boiler and the condenser, the law of expansion becomes very variable, and the problem of determining it extremely complex. It is certain, however, that a great waste of heat occurs in every case of this kind, as Mr. Isherwood's experiments have shown. In a paper read to the Institution of Engineers in Scotland, about two years ago, I discussed some of Mr. Isherwood's earlier experiments, and showed that they gave proof of a waste of heat, increasing with the fall of temperature, due to the expansion of the steam, with the extent of conducting surface of the cylinder, and with

the duration of the contact between the hot boiler steam and that conducting surface."

The great compeer of Rankine, in this department of physics, is Regnault, of France. In a paper published in the London and Edinburgh *Philosophical Magazine*, October, 1854, he thus states the difficulties of the problem:—

"For my own part, I have long labored to bring together the experimental data by means of which the theoretical motive power produced by a given elastic fluid, which undergoes a certain change of volume, as well as the quantity of heat which becomes latent by this change, might be calculated *à priori*. Unfortunately these data are very numerous, and most of them can only be determined by extremely delicate and difficult experiments."

That the problem of the force of expanding steam in a steam engine, which has baffled the genius of all the eminent physicists of the world, including Rankine and Regnault, with their delicate apparatus, with their exhaustless patience, and with their masterly knowledge of the conditions—is to be determined by two engines of different construction, with different boilers, placed on boats with different wheels, and tumbling about among the billows of the Atlantic, is simply ridiculous.

But, if Mr. Forbes has constructed a propelling apparatus, embracing engine, boiler and wheels, which will, under the same conditions, with a given quantity of coal, propel a vessel of given size and form more rapidly than the propelling apparatus constructed by the Government, most assuredly he ought to have an opportunity to demonstrate it; and when the legal questions in relation to the contract are settled in a proper manner, we hope the proposed trial will take place. If Mr. Forbes's apparatus should prove to be superior to that of the Government, then steps should be taken to ascertain wherein the superiority lies, whether in the engine, boiler, or wheels, and the improvement should be adopted.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING AUGUST 15, 1865.

Reported Officially for the Scientific American.

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49,358.—Manufacture of Gas for Heating and Illuminating Buildings, and for Other Purposes.—Thomas Arnold, New York City:

I claim a gas-generating apparatus, in which superheated steam is passed through incandescent carbon, and thence through a chamber immediately over the carbon, into which petroleum or other hydro-carbon is admitted, and the gaseous products conveyed away and burned below such apparatus, as specified.

I also claim the arrangement of the steam passages, g, carbon chamber, a, chamber, c, and pipes, e f, for the purposes and as specified.

49,359.—Washing Roller.—J. E. Atwood, Lynn, Mass.:

I claim the hand washing roller, constructed substantially as described, with a handle, roller, armlet and frame.

49,360.—Washing Machine.—J. E. Atwood, Lynn, Mass.:

I claim the frames, A C, constructed directly together at one end, and connected at the opposite end by braces, e, and springs, f, in combination with the cylinder or drum, B, and roller, D, substantially as herein specified.

49,361.—Wringing Machine.—J. E. Atwood, Lynn, Mass.:

I claim the combination of the concave wooden roller and the convex rubber-covered roller, substantially as used for the purpose described.

49,362.—Sinking Deep Well Tubes.—H. R. and M. T. Barnes, Watkins, N. Y.:

We claim the employment of an interior rod or tube, B, in combination with a water pipe, A, in driving into the earth, substantially as and for the purpose herein set forth,

Second, In combination with the rod or tube, B, and pipe, A, we also claim the adjustable shoulder, C, substantially as specified.

Third, In combination with the rod or tube, B, and pipe, A, we also claim the detachable point, D, so arranged that when the pipe is driven in place, the point may be forced still lower to make a depression in the earth, substantially as described.

49,363.—Sugar Evaporator.—Thompson C. Bartle, Independence, Iowa:

I claim the combination of the steam coil, F, with one or more pans, D, in connection with the boiler, C, substantially as set forth.

49,364.—Spring Punch.—Peter Bauer, Newark, N. J.:

I claim the revolving anvil, E, provided with one or more faces for the punches in the head, C, and with socket corresponding to the heading tools in said head, substantially as and for the purpose described.

49,365.—Flour Bolt.—John Beall and Samuel K. Schaffer, Decatur, Ill.:

We claim the application to a bolt reel of a series of pivoted arms, provided at their ends with weights, c c', the ball or weight, c, at one end of the arms being heavier than the balls or weight, c', at the opposite end, and all arranged to operate in the manner substantially as and for the purpose set forth.

[This invention relates to a new and improved knocking device to be applied to flour bolts, for the purpose of keeping the same clean or open, so that the flour may readily pass through them.]

49,366.—Water Gage for Steam Generators.—Henry Belfield, Philadelphia, Pa.:

I claim the combination and arrangement of the cap, G, glass tube, F, spiral spring, J, nut, I, elastic packing, e, and tubular projection, H, as herein set forth.

49,367.—Manufacture of Felted Yarns.—John H. Bloodgood, New York City, and Moses A. Johnson, Lowell, Mass.:

We claim a felted thread or yarn composed of felting and non-felting materials, the same being a new article of manufacture.

49,368.—Machine for Making Pipe Core.—William and George Braid, New York City:

First, We claim the combination of a rotating center-piece, G, rotating pressing roller, B, and templet or scraper, J, the whole arranged and operating substantially as and for the purpose herein specified

Second, The hopper or feeding box, B, with its vibrating bottom, in combination with the compressing roller, B, and center-piece, G, substantially as and for the purpose herein described.

Third, The arrangement of the center-piece, G, in bearings in the two connected levers or rockers, I I, and in combination with a movable clutch, K, and driving gear, L, substantially as and for the purpose herein specified.

49,369.—Loom.—John Braun, Philadelphia, Pa.:

First, I claim the oblong slot, d, in the end of the working beam, C, in combination with the eveners, D D, and levers, i k, constructed and operating substantially as and for the purpose set forth.

Second, The manner described of supporting and of operating the eveners, by connecting them at or about their centers, the one with the working beam, C, and the other with the working beam, p, which receives its motion from the one connected to the main beam, substantially as described.

49,370.—Sifting Shovel.—J. P. Buckland, Holyoke, Mass.:

I claim the use of the wire netting in the construction of sifting shovels, the frame or skeleton of which is composed of cast metal.

49,371.—Revolving Crutch Feet.—J. G. Bugbee, Bangor, Me.:

I claim a reversible crutch foot, arranged and operated substantially in the manner described and for the purposes specified.

[This invention consists in hanging and arranging a crutch foot, formed upon one end with one or more sharp points or projections, and upon the other with a flat or even surface, within the lower end of the crutch, in such a manner that it can be easily revolved therein, and thus adapted to the condition of the sidewalk upon which the person using the same is walking.]

49,372.—Wringing Machine.—J. D. Burdick, Ashaway, R. I.:

I claim, First, In combination with the two rollers, C C', the supplemental shaft, E, provided with pinions, d d, which gear into pinions, c c, on the lower roller shaft, a, and the elastic belt or straps, H, all arranged to operate substantially as set forth.

Second, The combination of the double side-pieces, A, tenons, J, and socketed clamps, K L M, all constructed and arranged as specified.

[This invention is designed to obviate the difficulty attending the spreading apart of the rollers of wringing machines, and the consequent separation of the gearing by which the rollers are connected or driven one from the other—a contingency of frequent occurrence, owing to the unequal thickness of the layer of clothes passing between the rollers. The invention has further for its object an improved mode of securing the machine to the wash tub.

49,373.—Ventilator for Houses.—Benajah J. Burnett, Mount Vernon, N. Y.:

I claim, First, The combination with a ventilator, constructed, arranged and applied as described, of the regulating valve or valves, operating substantially as and for the purpose herein fully described.

Second, The air distributor, F, in combination with the air ducts, a b c d, and deflectors, r r, substantially as and for the purpose herein specified.

Third, The shield, G, extended over the upper outer opening, o, and deflector, r, and open at the sides, substantially as and for the purpose herein set forth.

49,374.—Ventilator for Ships, Etc.—Benajah J. Burnett, Mount Vernon, N. Y.:

I claim, First, The combination of the stationary or fixed partitions, with the longitudinally movable partitions or wings, arranged and operating substantially as and for the purpose herein described.

Second, The combination of the sidelight or shutter with the movable partitions or wings, substantially as described.

49,375.—Beehive.—Tobias Burris, Fieldon, Ill.:

I claim the combination of the oil drawer or receptacle, D, perforated bottom, C, and passage tube, E, with the hive, B, substantially as and for the purpose herein set forth.

49,376.—Brick Machine.—E. P. H. Capron, Springfield, Ohio:

First, The rotary mold wheel or table, D, in connection with a bearing, M, and inclined adjustable section, L, and rising and falling plungers or followers, F, for the purpose of molding or pressing brick, as set forth.

Second, The particular arrangement of the annular way or track, H, section, I, and the bearing, M, as shown, whereby the lids of the molds are held down by the bearing, M, while the pressure is given by the section, I, as described.

Third, Arranging the section, I, as shown, or in any other equivalent way, so as to render the same capable of being adjusted to regulate the pressure on the clay, in the molds, as set forth.

Fourth, The friction rollers, G, at the lower ends of the plungers or followers, F, and the friction rollers, L, in the lids or covers, K, for the purpose specified.

Fifth, The hinged lids or covers, K, provided with the arms, d d', in connection with the projections, e e', attached to the framing, substantially as and for the purpose set forth.

Sixth, The lips, i i, at the lower ends of the plungers or followers, in connection with the plate, h, or its equivalent, attached to the inclined plane, b, for the purpose of lowering or drawing down the followers, as set forth.

Seventh, The lubricating device for the plungers or followers, the same consisting of grooves, g, made in the plungers or followers, and provided with strips of cloth or other absorbant material, substantially as described.

49,377.—Weighing Apparatus.—Benj. Churchill, Wareham, Mass.:

I claim the construction of its beam and movable weight, and the arrangement of knife-edge bearings relatively to the beam, substantially in manner as explained, so as to enable the weight to be moved across the axis of motion of the beam, as and for the purposes specified,

I also claim the arrangement of the shot-receiving chamber or vessel with the platform, as described.

49,378.—Animal Trap.—J. W. Churchill, Pittston, Pa.:

I claim the combination of the counter-balanced platform bar, I I, gate, D, and their rod and lever connections, operating in combination with the platform stop and the box, A, as and for the purpose described.

[This invention consists in providing a rat and mouse trap with a door, arranged in such a manner that it will remain open at all times, whether an animal is in or out of the trap, but will close whenever an animal attempts to get out of the same. The object of the invention is to obtain a simple and efficient trap, which will always be set, and will not be liable to get out of repair.]

49,379.—Piston Packing.—David Clark, Hazleton, Pa.:

I claim the emprovement in piston packing herein described, the same consisting in forming in and extending entirely around the periphery of the piston a series of one or more grooves or channels, in combination with one or more expansible metal ic rings upon each end portion of the said periphery, arranged and operating substantially as and for the purposes specified.

[This invention consists in forming around the periphery of the piston a series of parallel grooves or channels, in combination with one or more expansible split metallic wings placed upon each end of the piston, and so arranged that the steam can enter between them and the piston, whereby they are caused to be thrown out or expanded, as it were, sufficiently for the piston to fit its cylinde with the requisite tightness insure its operation; these grooves also serve as so many channels or receptacles for the water from the condensed steam, penetrating thereto when steam is first admitted to the cylinder, whereby the sides of the cylinder are always kept moistened and lubricated, thus preventing the piston from cutting it.]

49,380.—Water Wheel.—J. M. Clark, U. S. A.:

I claim the two wheels, C C, provided with buckets, a, as shown, and keyed on one and the same shaft, B, in combination with the block, A, provided with the water passages, b c c, grooves, d d, and escape passages, e, all arranged to operate substantially as and for the purpose set forth.

[This invention relates to a new and improved water wheel, which is also applicable for use with steam as a motor. It consists in the employment or use of two wheels, placed on one and the same shaft with a block between them, having water ways or passages made in it.]

49,381.—Curtain Fastening.—John R. Cook, Winsted, Conn.:

I claim a curtain fastener the elastic or flexible band, substantially such as and for the purpose described.

49,382.—Composition for Filling the Pores of Wood.—DeWitt C. Cooley, Chas. F. Smith and C. E. Bradley, Aurora, Ill.:

We claim a compound for filling wood, made of the ingredients herein described, and mixed together in about the proportions and substantially in the manner set forth.

49,383.—Treating Glue Stock.—Chas. W. Cooper, Brooklyn, N. Y.:

I claim treating the residuum of glue stock, after the glue has been extracted, with sulphuric or other acid, and removing the grease set free by such acid, substantially in the manner described.

49,384.—Machine for Pressing Bonnets and Hats.—Edwin Copleston, Wrentham, Mass.:

First, I claim in machines for pressing hats and bonnets, the combination of the traveling bed, B, the frame, C, which revolves upon it, the segment ratchet, S, with a hat block, W, the said plates being constructed and operated substantially as and for the purpose above described.

Second, I also claim the combination of the parts mentioned in the preceding claim, which presents the hat block in different positions with the arms, which carry the flats, and with the revolving upright shaft, L, the said arms and shaft being constructed and operated substantially as above described.

[The object of this invention is to produce a machine which will enable the operator to adjust the parts so as to press either bonnets or hats; also, to save the expense and trouble of the present mode of working, which requires three machines to complete the pressing of a hat; also, to decrease the expense of the castings and other parts of the machinery used in this manufacture.]

49,385.—Car Coupling.—Joseph Couch, Harrison, Me.:

I claim the lever, with the lip and suspension bar attached, in combination with the fulcrum and rest, substantially as described and for the purposes specified.

49,386.—Coupling for Drill or Pump Rods.—John R. Cross, Chicago, Ill.:

I claim lapping the contiguous ends of the two rods to be coupled together past each other and cutting a screw thread thereon which shall run contiguously from one to the other in combination with a sleeve or nut working in the manner and for the purposes set forth.

49,387.—Tire Machine.—Chauncey L. Crowell, Peoria, Ill.:

I claim the bar, a, which connects the shear with the movable slide as shown and described.

49,388.—Horse-shoe Calking Vise.—Ford B. Curtis, Gardiner, Me.:

I claim the horse-shoe calking vise, constructed with the caulk-forming recess or slope, c, in one of its jaws and having its other jaw extending above such recess and arched substantially as and for the purpose specified.

49,389.—Plow.—Richard Deighton, Jr., Fairweather, Ill.:

I claim the plow frame constructed of the two beams, A and A', the cross piece, B, the posts, D and D', and handles, C C, substantially as and for the purpose set forth.

49,390.—Fruit Basket.—John H. Doolittle, Derby, Conn.:

I claim the combination of the bent strip having its ends interlocked and bottom board with the surrounding and retaining bands, the whole arranged to constitute a box or basket, substantially such as hereinbefore described.

I also claim sustaining the bottom of the basket by means of a band, l, passed around the body of the basket and through slots, substantially in the manner set forth.

49,391.—Rotary Engine.—Henry Durre, New York City:

I claim the adjustable cylinder, B, with its manner of adjustment, in combination with the reversible steam cocks, K K, and steam and exhaust pipes, e f, together with the rotary piston with centrifugal valves, substantially as and for the purpose described.

49,392.—Cane Juice Evaporator.—Walter Edgerton, Spiceland, Ind.:

I claim, First, Supporting the coupled pans, B B', by the flanged sleeve or center, a, or its equivalent, carried by the standard, C, and operated to raise the pans by the hand lever, e, substantially as and for the purpose set forth.

Second, Coupling the pans, B B', together with an inclination relatively to each other, in the manner and for the purpose described.

49,393.—Ship Pump.—Jacob Edson, Boston, Mass.:

I claim, First, The combination and arrangemsnt of the head of the pump, formed as described, with the collar or deck plate, the two forming a self-adjusting joint that enables the pump to be set and fastened at any described inclination, as set forth.

Second, The lower valve box or support, formed with a series of prongs sprung into and holding with an elastic force upon the valve seat, as described.

Third, The combination of a wedge-shaped valve box or support, with a seat having two different tapers for the purpose of holding the valve box or support firmly and yet allowing of its easy removal for repairs, as described.

Fourth, A flexible disk valve so arranged with regard to its seat, and a suitable support as when closed to cover the space between the said seat and support, and to play independently of the latter, as described and for the purpose specified.

49,394.—Repeating Action for Pianos.—Fardinand Farholtz, Louisville, Ky.:

I claim the double notches, a, upon the hammer butt, b, in combination with the bracket, adjustable pad, e f, and jack, B, all constructed, arranged and employed in the manner and for the purposes herein specified.

49,395.—Row Lock.—Ira C. Flagg and F. W. Flagg, Middletown, Conn.:

I claim the circular groove, d, and slot, e, in the stem of the horns, in combination with the pin, c, and socket, c, constructed and operating substantially as and for the purpose described.

49,396.—Machine for Cutting and Grinding Fodder.—Isaac Fulton, Madison, Pa.:

I claim the arrangement of the disk, A, flexible and adjustable plate, B, pulleys, C and D, belt, E, and bonnet, F, the whole being arranged, constructed and operating substantially as herein described and for the purpose set forth.

49,397.—Winding and Setting Watches.—F. A. Giles, New York City:

I claim the combination with the vibrating yoke plate, D, carrying the two wheels, f and g, one of which is arranged to gear with the wheel, E, on the winding arbor, and the other with the cannon pinion of a wheel, C, having a series of teeth, e, on its periphery, which gears with the wheels, f and g, and a series of contrate teeth, c, which gears with a spur wheel, b, on the spindle passing through the stem, the whole arranged and operating substantially as herein described.

49,398.—Cupboard Latch.—Benjamin P. Grover, Holyoke, Mass.:

I claim the double guard, e, having a central and end stops. f,' f, substantially as described.

Second, I claim the employment of the thumb piece, g, in combination with the guard, e, and latch, b, substantially as and for the purpose described.

49,399.—Piano.—Anthony Gunther, Philadelphia, Pa.:

First, I claim the second vibrating bridge, A, as herein shown and described.

Second, The combination of the vibrating bridge, A, with the second sounding board, c, as herein shown and described.

49,400.—Car Truck.—C. H. Hall, New York City:

First, I claim attaching the front and rear wheels in pins to the bars, D D, arranged parallel with, and pivoted to, the sides of the truck-frame, substantially as set forth and for the purpose described

Second, The iron frames, A B C E, on which the car rests, cast in a single piece, substantially as and for the purpose described.

Third, A truck wheel with an annular groove each side of the central partition, O, in combinatoin with two sets of anti-friction balls, a fixed axle, and side washers, and the iron frame, A B C E, substantially as and for the purpose described.

Fourth, In a series of friction balls, the arrangement alternately of larger and smaller balls, when combined with a truck frame, substantially as and for the purpose described.

Fifth, The hollow axle, S, provided with an outer flange, n, in combination with the bars, D, truck wheel, and anti-friction balls and truck frame, substantially as and for the purpose described.

Sixth, The removable part, n, of the axle, and the washer, M, cast in one piece, in combination with the truck wheel, L, and anti-friction balls and truck frame, substantially as and for the purpose described.

49,401.—Banjo.—Frederick W. Harlass, New York City:

I claim the rings, b and c, within the cylinder of the banjo, pressed apart by screws to strain the head, as specified.

I also claim the ring, f, in combination with the rings, b and c, and cylinder, d, fitted and employed as and for the purposes specified.

49,402.—Machine for Drying and Pressing Leather.—George Harvey, New York City:

I claim, First, In combination with the rollers, D D2, the regulating screws, J and J2, plates, I and I2, and springs, b2, when the same shall be constructed, operated and combined, substantially as and for the purpose specified.

Second, In combination with the same, I claim the use or employment of the journal, C, supporting a roller and drainer, L, for the purpose herein fully set forth.

49,403.—Sheep Rack.—Charles M. Hicks, Rushville, New York:

I, claim, First, The sides, B B, attached to the framing, substantially as shown, to admit of swinging outward from the lower edges of the boards, A A, and also of being raised and lowered to admit of being fastened to, and unfastened from, the rack, as described.

Second, The end pieces, C, in connection with the sides, B, to form the ends of the troughs when the sides are down or in a closed state.

[This invention consists in a novel manner of constructing the rack, whereby a cheap and durable rack is obtained, and one which affords great facilities for cleaning.

49,404.—Flour Chest.—Martin W. Hill, New York City. Antedated Aug. 4, 1865.

I claim, First, The combination of the sliding molding board, I, hinged lid, A, and one or more flour-bins, K, substantially as and to the effect herein set forth.

Second, The arrangement hereinabove described of the sliding molding board, I, doors or covers, L, one or more of them, or their equivalent, and one or more spouts or openings, J, for admitting the flour to the bins, as set forth.

Third, The combination of the hinged shelf, E, with the lid, A, substantially as and for the purposes set forth.

Fourth, The combination of one or more flour bins, K, one or more side doors, M, opening thereto, and inner sliding or movable boards for retaining the flour, said inner doors to be so secured as to be each of them capable of ready and complete removal, so as to leave completely open and unobstructed space from the upper remaining board to the top of the opening, which the series of said boards is intended to partially close, substantially as and to the effect above set forth.

49,405.—Horse Hay-fork.—N. D. Hinman, Pleasant Dale, Conn.:

I claim, First, Securing or attaching of the teeth or tines to the fork-head, by having the rear ends of the former made in the form of three sides of a quadrantgle, to receive the fork-head. The front sides of the quadrangles being fitted in grooves in the front side of the head, and the rear sides provided with eyes, through which and eyes at the rear of the clips, to which the bail is attached, a rod passes, substantially as herein described

Second, The catch, G, bar, H, and arm, I, all arranged and applied to the handle, B, and in relation with the bail, F, to operate substantially as set forth.

[This invention relates to a new and improved hay-fork for elevating hay in barns by means of a horse, and it consists in a novel construction of the same, whereby the fork is rendered more durable than usual, the head of the fork, not being weakened by the securing of the teeth or tines to it; and the invention further consists in a novel top mechanism for elevating the fork to discharge its load, whereby the trip-rope is made to operate perfectly in any direction, either horizontally or vertically, thereby admitting the fork to be used in the ordinary way, or with a truck on ways in the upper part of the barn.]

49,406.—Uterine Supporter.—S. L. Hockett, Pittsburgh, Pa.:

I claim attaching the front ends of the wires, S S, to the bars, A, by screwing the end of one of the wires into one of the projections, e, at right angles to the line of said bar, so as to act as a hinge, while the end of the other wire is left perfectly plain, and bent so as to pass through a hole in the other projection, e, diagonally to the length of the bar, to form a hook, in the manner substantially as herein shown and set forth.

49,407.—Defensive Armor for Vessels of War.—C. O. Holyoke, Boston, Mass.:

I claim the arched metallic beams, F, constructed and applied substantially as set forth, for the purpose specified.

I also claim the arched backing, G, constructed and appplied substantially as described, for the purpose set forth.

I also claim the curved cross laminated facing, H, constructed and applied substantially as set forth, for the purpose described.

I also claim the flat cross-laminated facing, I, constructed and applied substantially as set forth, for the purpose described.

I also claim the tie bars, E, with their projections, a, in combination with the arched beam, F, substantially as described.

49,408.—Pump.—Wm. D. Hooker, Stockton, Cal.:

I claim the vertical inclined partition, h, in combination with the suction valve seats, C1 C2, and discharge valve seats, d1 d2, the whole arranged as described and for the purpose specified.

49,409.—Magazine Fire-arm.—G. W. Hughes and J. G. Pusey, Providence, R. I.:

First, We claim the magazine, B, having a concave bottom as shown, with the sliding cover, constructed as described, so combined and arranged that the magazine can be filled without detaching any of the parts.

Second, In combination with the magazine, B, the oval spring, C, substantially as described.

Third, The bevel-faced follower, D, in combination with the cap, a, provided with the fingers, f, arranged and operating substantially as and for the purpose set forth.

Fourth, The carrier frame, A, cut away internally, to permit the location of the hammer therein, substantially as shown.

Fifth, The breech block, G, when recessed as shown and described and having a hole for the nose of the hammer to strike through, as set forth.

Sixth, The hammer, H, constructed as shown and located inside of the carrier frame and breech block, as and for the purpose set forth.

Seventh, We claim locating the main spring, K, in the lever guard, O, substantially as shown.

Eighth, The indicator, L, operating substantially as set forth, for the purpose of showing when the gun is cocked.

Ninth, The coiled spring, o', located in the annular recess surrounding the shaft, M, of the retractors as and for the purpose set forth

Tenth, The stop, N, constructed and operating as herein set forth.

Eleventh, We claim making the under side of the sliding cover of the magazine concave or arched, substantially as shown, to fit it to the form of the bullet.

49,410.—Hydro-pneumatic Engine.—John Adam Huss, St. Louis, Mo.:

I claim the compression by hydraulic pressure, acting on the principle of the hydraulic ram, of air into air reservoir, to a sufficient degree of intensity to serve as a motive power.

49,411.—Shutter Case.—James Ingraham, New York City:

I claim the stationary frame, a, below the sidewalk or other surface in combination with the sliding shutter case and screw, substantially as and for the purposes specified.

49,412.—Hospital Bedstead.—Anthony Iske, Lancaster, Pa.:

I claim, First, A bedstead of two independent sections, A B, fitting and sliding into each other in the manner and for the purpose specified, in combination with their folding legs, R U, and head board or frame, A, and removable foot board or frame, Q.

I claim the pillow support formed by the arms, I, braces, L K, block, P, and bands or webbing, m m, all arranged and operating substantially in the manner and for the purpose specified.

49,413.—Potato Digger.—James O. Ives, St. Louis, Mo.:

I claim, First, Two rollers, f and s, one above and the other below the axletree, r, extending round which is the belt, d, with same kind of teeth as on cylinder, which teeth pass between those on the cylinder at every revolution and carry the potatoes over the upper roller, as shown and set forth.

Second, I also claim a row of teeth on cylinder and on belt, to keep the potatoes from rolling out at either side of the same if necessary.

49,414.—Steam Valve.—John Johnson, New York City:

I claim the valve, d, guided in the cylinder, e, and taking a ribformed seat upon the diaphragm in combination with the screw rod, f, collar, h, and disks, K and T, for the purposes and as specified.

49,415.—Shoe.—Joseph L. Joyce, New Haven, Conn.:

I claim the combination of the elastic gore and lacing in the front with the side opening, substantially in the manner and for the purpose specified.

49,416.—Scale Borer for Steam Boilers.—Charles H. Keener, U. S. N.:

I claim the combination and arrangement of the bed plate, A, spindle, G, cutter head, H, auxiliary spindle, G2, hand lever, I, clamp, k, and standard, J, substantially upon the principle and in the manner as herein set forth.

[This invention relates to a tool intended to remove the scale from the interior of boiler tubes, and particularly from tubes in what is known as the Martin boiler.]

49,417.—Lantern.—Joseph Knitz, West Meriden, Conn.:

I claim the connecting of the two parts, B E, of the lower part of the lantern together to admit of the turning of the same as described, in connection with the flange, c, and door, F, on the upper end of B, and the opening, d, in E, all being arranged substantially in the manner and for the purpose set forth.

[This invention relates to a new and useful improvement in that class of lanterns which are provided with doors or openings to admit of the wick being lighted, adjusted and trimmed without removing the lamp from the lantern.]

49,418.—Deep Well Tube.—Henry R. Koon, Pittsfield, Mass.:

I claim the perforated casing, B, in combinition with the shoe, A, and perforated well tube, C, as and for the purpose specified.

49,419.—Bracket for Shelves.—Charles F. Kuhnle, Harrisburg, Pa.:

I claim the bracket, B, formed with the projection, b, and flange, b', as and for the purposes herein specified.

49,420.—Cartridge Box.—A. D. Laidley, Philadelphia, Pa.:

I claim, First, A cartridge case with recesses in both edges for containing cartridges and provided with two flaps, and so suspended to the accouterments that it can be reversed as described for the purpose specified.

Second, The plates, C, hung to the ends of the case and constructed for attachment to the belts, D and E, substantially as described.

49,421.—Sewing Machine.—Thomas Lamb and John Allen, Philadelphia, Pa.:

First, We claim alternating the threads which form the seam from one side to the other of the shuttle, so as to remove the twist from shuttle thread, substantially as above described.

Second, We also claim the finger guides, j j, and the slots, O O1 O2, formed in the slide, C, substantially as and for the purpose above described.

Third, We also claim operating the feeding dog by means of the slide, C, through the action of the slot, h, with its curved outer side and its projecting side, i, and through the action of the elevation, p, the said devices being placed on the slide, C, and acting against the under side of the dog, and against its finger, n, substantially as above described.

Fourth, We also claim the combination of the sliding ring of the arm, J, the castor pin, a, and the grooves, t t, for the purpose of producing the reciprocation of the slide, substantially as above described.

Fifth, We also claim the loop-detaining hook, g, placed on the inside edge of the shuttle, substantially as herein shown

[This invention in sewing machines consists in several particulars, among which are the inclined position of the race in which the shuttle travels; the peculiar construction and operation of the sliding-piece, which produces not only the necessary reciprocations of the feeding dogs, but also controls and guides the needle thread in making an interlocked stitch with the shuttle thread, and brings the shuttle thread first on one side and next on the other side of the revolving shuttle.]

49,422.—Governor Valves.—Charles W. Le Count, Norwalk, Conn.:

I claim the arrangement of the ball and socket joint in the rod of the throttle valve lever of steam engine governors, in the manner substantially as herein described and for the purpose set forth.

49,423.—Machine for Raking and Loading Hay.—Miles K. Lewis, John C. Durbin and Lyman P. Lewis, Iowa City, Iowa:

We claim, First, A three-pronged rake tooth, hinged to a vibrating head by two of its prongs, so as to vibrate on the head, and with the third prong working up and down through the head, substantially as described.

Second, And, in combination with the raking teeth, we claim the roller, D, arranged behind the teeth, for the purpose set forth.

Third, We claim the adjustable bar, D2, to support the rake heads, as described.

Fourth, We claim the straps, Q, in combination with the boards, L2, and rails, G G, as described.

49,424.—Gas-fitter's Tongs.—Andrew B. Lipsey, New York City:

I claim the clamp or wrench herein described, especially adapted for gas-fitting purposes, the same consisting in the combination of two shafts, constructed, arranged and operating together substantially in the manner specified.

49,425.—Machine for Driving Hoops on Casks or Barrels.—J. A. Loomis, Fond du Lac, Wis. Antedated Feb. 15, 1865:

First, I claim the combination of the drivers, D, springs, E, and toothed bar, B Q, when constructed as and for the purposes herein described.

Second, In combination with the above, I further claim the rack, A, on the bar, B, the gearing, e L K, treadle, I, and weight, C, all arranged to operate as described.

Third, The band, F, with the pendants, G, attached, acting on the projecting upper ends of the pivoted drivers, D, when elevated as herein described.

Fourth, The ring, U, in combination with the drivers, D, substantially as and for the purpose set forth.

[This invention relates to a new and improved device for driving hoops on casks, whereby the work may be done in a very rapid and perfect manner.]

49,426.—Window.—William Maurer, Buffalo, N. Y.:

I claim the application of spring levers, in combination with sashes which have a swinging and a rising and falling motion, substantially as and for the purpose set forth.

Also, The use of a follower, in combination with the rising and falling sashes, substantially as and for the purpose described.

[This invention relates to a window constructed on what is commonly known as the French plan—that is to say, with two wings which swing on hinges and open and close like a door.]

49,427.—Apparatus for Removing Buildings.—John S. McIntire, Chicago, Ill.:

First, The balance, F F', composed of two or more pieces of timbers centrally pivoted to each other, substantially as and for the purposes set forth.

Second, The combination of the balance, F F', and block, C, with the shoes B.

Third, The arrangement and combination of the balance, F F', block, C, shoes, B, rollers, E, to be used in moving buildings without leveling a track for them, substantially as set forth.

49,428.—Folding Desk.—J. F. McNee, Philadelphia, Pa.:

I claim a desk composed of pieces hinged and otherwise connected together and arranged for being folded, substantially as and for the purpose herein set forth

49,429.—Grain Screen.—Charles S. and Joseph B. Messenger, Logansport, Ind. Antedated Aug. 11, 1865:

We claim the cylinder, C, in combination with screen, E, the several parts being constructed, arranged and operated as and for the purpose specified.

49,430.—Brick Machine.—Isaac Morley, Allegheny City, Pa.:

First, I claim pressing the clay into the molds by means of steam or other fluid acting on the plates, L, or their equivalents, substantially as shown and described.

Second, The movable molds, E, in combination with the frames D and G, arranged and operating substantially as and for the purpose herein set forth.

Third, I claim operating the frames, G E and D, by means of the wheels and slides, or their equivalents, as and for the purpose set forth.

Fourth, I claim the arrangement of the frame, D, as shown in Fig. 5, whereby the bricks in the molds shall be moved back from contact with the clay in the hopper or the plates, F, as and for the purpose set forth.

49,431.—Steam Generator.—Henry B. Meyer, Cleveland, Ohio:

First, I claim a swinging reservoir suspended within the fire box of a steam generator, and beneath the generating surface of the same, for containing hydro-carbon oils, substantially as shown and described.

Second, I claim a reservoir, B, for containing naphtha or other light oils used for inducing combustion in the oil reservoir, B, above it, in the manner and for the purpose as shown and described.

Third, I claim the combination of the reservoir, B and B, with the deflector, a, placed between them, substantially as shown and described.

Fourth, I claim the combination of the reservoir, B, with the fluid level indicator, D, substantially as shown and described.

Fifth, I claim the deflectors, F, in combination with the reservoir, B, as and for the purpose described.

Sixth, I claim the inverted cup or deflectors, M, placed above the deflectors, F, for the purpose of receiving and distributing the superheated steam, substantially as shown and described.

Seventh, I claim the combination and arrangement of the deflectors, F, and the inverted cups, M, substantially as and for the purpose described and shown.

Eighth, I claim the combination of the super-heating helical pipes, m, with the inverted cups, M, substantially in the manner shown.

Ninth, I claim the circular flues, H'' and P, placed in the base of the water chamber, substantially as shown and described.

49,432.—Canceling Stamp.—Marcus P. Norton, Troy, N. Y. Antedated Aug. 4, 1865:

I claim the adjustable punch, D, arranged and combined in the manner substantially as and for the purposes herein described and set forth.

I also claim the said punch, in combination with the cork, wood or any elastic substance, E, in the manner substantially as and for the purposes herein described and set forth.

49,433.—Foot Warmer.—Alonzo Palmer, Hudson, Mich.:

I claim the arrangement of the corrugated plate, B, with the frame, A, radiator, C, and lamp, E, the several parts being constructed and used in the manner and for the purpose herein specified.

49,434.—Bed Bottom.—Samuel Pearson, Cincinnati, Ohio:

I claim securing the joints of bed bottoms by means of a joint-piece constructed and applied to the corners of their frames, substantially as above described.

Second, The combination with the aforesaid joint-pieces of the double-armed springs, E F, and notched pins, c c, with the slats, C, and frames, D, when said pins and springs are constructed and employed as and for the purposes herein specified.

[This invention consists in an improvement in the supports of the slats of spring bed bottoms, and in their connections with such slats, and also in the mode of jointing or securing the ends of their rails to each other.]

49,435.—Band for Bundles.—Charles Perley, New York City. Antedated Aug. 4, 1865:

I claim the band for bundles of bills, paper, etc., formed of a tape with an eyelet, as specified, forming a new article of manufacture.

49,436.—Washing Machine.—Mason Pike, North Leverett, Mass.:

First, I claim operating the swinging beaters, D, by means of the pendant plates, G, connected by arms, H, to rock shafts, I, which are actuated by pitmen, K, from reverse cranks, L, on a shaft, M, substantially as and for the purpose set forth.

Second, The water chambers, R R, provided with valves, S, and arranged in relation with the suds box, B, substantially as and for the purpose specified.

[This invention relates to a new and improved clothes-washing machine, and it consists in a novel means employed for operating two swinging beaters, whereby the clothes are operated upon in the most perfect manner, and with but a slight expenditure of power.]

49,437.—Truss.—S. S. Ritter, Philadelphia, Pa.:

First, I claim the soft flexible pad or piece, E, made in semi-elliptical or semi-circular form, and employed to receive the pressure of the body immediately around the operating pad, substantially as and for the purpose set forth.

Second, I claim the spring, F, applied directly to the pad, B, in the manner and for the purposes herein described and represented.

49,438.—Apparatus for Preparing Peat.—M. S. Roberts, Lewiston, N. Y.:

I claim, First, The within-described machine for the manufacture of peat, the same consisting of the endless feeding band and its frame, and the box or receptacle for distributing and spreading the peat upon the ground, to be dried, arranged together, and connected with any proper mill for disintegrating the peat, substantially in the manner hereinabove described and represented in the drawings.

Second, The adjustable frame for the endless band, made in separate sections or parts, and connected together substantially as described and for the purpose specified.

Third, Connecting the endless band with, and operating the same by, the driving shaft of the mill, through gearing so arranged as to allow its outer end to be brought to any desired locality, substantially as and for the purposes specified.

Fourth, The arrangement of the distributing or spreading box for the peat, the same consisting in so attaching it to the driving power of the mill as to be freely turned or swung around upon the driving shaft thereof, without disconnecting the same therefrom, substantially as herein described.

Fifth, The use of the spiral feeding shaft for feeding the peat along n its spreader as fast as it enters the same through the tube thereof, connecting it with the disintegrating mill, arranged and operating substantially as described.

Sixth, The device described for marking the peat when spread upon the ground, arranged and connected with its distributor, as set forth.

[This invention relates to improvements in peat machines, with which much of the time, delay and expense now incurred by conveying the peat as it is collected to the mill, and then removing it therefrom, to be spread out for drying, are obviated, the importance and advantages of which are obvious to all conversant with the manufacture of peat fuel.]

49,439.—Driving Wheels of Harvesters.—E. P. Russell, Manlius, N. Y.:

I claim the combination of the driving wheel, A, the pinion, C, and friction roller, B, constructed in the manner and arranged substantially as described.

49,440.—Tree Protector.—Lockwood Sanford, New Haven, Conn.:

I claim the use of a clasp or fastener, composed of two semi-circular parts, as c c and e, for the purpose of fastening the joints of troughs for tree protectors, etc., when constructed and fitted for use, substantially as herein described and set forth.

49,441.—Flour Sifter.—Henry W. Sargeant, Jr., Lowell, Mass.:

I claim providing a sieve with a tunnel, substantially as and for the purpose herein described.

49,442.—Sash Supporter.—A. M. Sawyer, Athol, Mass.:

I claim a window-sash stop or supporter, consisting of an elastic roll, containing an unyielding block or center of an irregular form, in cross sections, substantially as described, the said roll revolving in suitable bearings, as set forth.

49,443.—Artificial Leg.—Jacob Schneider, Cincinnati, Ohio:

I claim the arrangement of the sheaths, A and B, and foot, G, the whole being connected together by artificial rods, D E F D' E' F', while elastic straps, H and I, connect to the sheath, B, the heel and the instep of the foot, substantially as set forth.

49,444.—Mode of Ornamenting Show Cards.—F. B. Scott, Buffalo, N. Y.:

First, I claim the combination of a printed or painted card, with yielding of glass, in such a manner that the parts of the letters or their shading, not on the glass, shall be supplied by the colors or shades on the card, substantially as specified.

Second, The exhibition of railroads or other routes by the same method as specified.

49,445.—The Giffard Injector.—William Sellers, Philadelphia, Pa.:

I claim the use of the overflow, d d, or its equivalent, in the Giffard injector, in combination with a reservoir to retain the overflow water in contact with the jet, for the purpose specified.

49,446.—Sad-iron Fixture.—D. L. Shaw, Lansing, Iowa:

I claim the employment or use, in connection with a sad-iron, A, of a reflector, B, heater, C, and a stool, D, constructed substantially as shown and described, and used either separately or combined, for the purposes set forth.

[This invention relates to certain fixtures for sad-irons, as hereinafter fully shown and described, whereby comfort and convenience in ironing clothes are greatly promoted, and the iron kept in a heated state much longer than usual.]

49,447.—Hoop-skirt Joints.—S. J. Sherman, Brooklyn, N. Y.:

I claim a skirt hoop, connected by a link, C, having a guard, D, arranged substantially as and for the purposes herein specified.

49,448.—Apparatus for Carburetting Air.—Warren A. Simonds, Boston, Mass.:

First, I claim operating an oblong and endless belt, with buckets and troughs attached independently and loosely, over a pulley, the diameter of which is largest in the centre of its length, and which is made fast to a shaft, said shaft being operated with gears and weights below.

Second, I claim adjusting a long oblong and endless belt, made from leather, meta or other material, with buckets and troughs attached, so that the lower part, or about one-fourth to one-third of its length, shall be submerged in volatile liquors, such as hydrocarbon, as herein shown.

Third, I claim a reservoir of any desired shape or position, whether perpendicular or horizontal, with a shaft and pulley upon the inside, above the centre and near the top of said reservoir, and with a long, endless belt, with buckets or troughs more or less in number attached, and operated as above described.

49,449.—Apparatus for Regulating the Pressure and Delivery of Gas.—Warren A. Simonds, Boston, Mass.:

First, I claim, In combination, the double cylinder, B B', the bell, C, and the interior mechanism, or its equivalent, as shown, for the purpose specified.

Second, I claim a double-cylinder reservoir, with two or more openings in and through the bottom for the inlet; others for outlet or outlets within the inside reservoir, in combination with the regulator valve, shown in figure 3, or its equivalent, as set forth.

Third, I claim the construction of a floating reservoir, open at the bottom but tight at the top, with a man-hole at its center for connections from the in and outside, the said reservoir to float in the outside reservoir and between the in and outside cylinders, when used for purposes herein described.

Fourth, I claim connecting to the inlet opening upon the inside a plug or screw valve, with a reversable double pulley, to be operated by a cord, or cords, one end of which is connected upon the inside of the top of the floating holder, while on the end of said cords is a weight sufficient to reverse and open the cock or valve when the holder falls, as specified.

Fifth, I claim the arrangement of the pulleys in the cross-piece, F, and the cord and weight, in combination with the floating-holder for sustaining in part the weight of the holder, as specified.

49,450.—Churn.—William H. Slonaker, Cooperstown, Pa.:

I claim arrangement of the notched guides, j j', in combination with a crank shaft, C, pitman rod, I h, turn button, i, and churn box, A, with supports, B, substantially in the manner and for the purpose specified.

49,451.—Machine for Tempering Saws, Files, Etc.—John Small, St. Louis, Mo.:

First, I claim the arrangement of the vertical perforated jaws, C C', which are constructed with narrow ribs or elevations upon their surfaces, in combination with the bath tub, A, and the adjusting devices of one of the jaws, substantially in the manner and for the purposes herein described.

Second, The construction, arrangement and operation of the adjustable hooks, g g, in combination with the jaws, C C', substantially in the manner and for the purposes described.

Third, The arrangement of the adjusting and bracing rods, b b', with the jaws, C C', hooks, g g, bath tub, A, and inner support, A', substantially in the manner and for the purposes described.

49,452.—Hand Stamp.—Samuel J. Smith, New York City:

First, I claim a movable bed, or section of the bed, in combination with a hand stamp, substantially as specified, whereby the impression can be made against the movable portion of the bed, or against a book, or other article, when the bed is removed, as set forth.

Second, I claim a ribbon holder, a carrier attached to, and adjustable on, the sliding rod, that carries or forms the stamp, substantially as and for the purposes specified.

49,453.—Tree Protector.—James C. Starbuck, Cambridge, Mass.:

I claim the tree protector as made of a fluid-containing trough, placed upon a tubular stand, surrounding the trunk and supported from the grouud, substantially as and for the purpose specified.

49,454.—Apparatus for Making Paper Bags.—Byron B. Taggart, Watertown, N. Y.:

First, I claim the method herein described of making paper bags or sacks.

Second, In the manufacture of paper bags, substantially as herein described, I claim the use of the apparatus or implement, when constructed and arranged for operation, as hereintofore set forth.

Third, As a new article of manufacture, I claim a paper bag or sack, made in the manner and by the means hereinbefore set forth.

49,455.—Hay Rack for Wagons.—William M. Thomas, Binghamton, N. Y.:

I claim a rack for hay and grain having its several parts secured together in the manner substantially as shown and described, to admit of said parts being fitted together and taken apart and adjusted to the wagon and taken therefrom with the greatest facility, and also of being stowed away in compact form when not required for use.

[This invention relates to a new and improved hay and grain rack for wagons and carts, and it consists in constructing the rack in such a manner that it may be applied to and removed from a wagon or cart with the greatest facility by a single individual, and placed or stowed away in a very small space, when not required for use.]

49,456.—Shank Cutting Machine.—S. D. Tripp, Lynn, Mass.:

I claim the grooved and toothed or corrugated rollers, C C, in combination with the adjustable knife or cutter, D, having a zig-zag cutting edge, all arranged to operate substantially in the manner as and for the purpose set forth.

[This invention relates to a new and improved machine for cutting shank-pieces for boots and shoes, while pieces are placed between the inner and outer soles to give a roundness to the latter and strengthen the shank.]

49,457.—Brush.—Abram Van Dusen, Chicago, Ill.:

I claim a brush made by the employment of whalebone, haircloth and combined with any suitable material having a flange or knob as above described.

49,458.—Device for Cleaning Lamp Chimneys, Bottles, Etc.—James T. Walker, Palmyra, N. Y.:

I claim an instrument for cleaning lamp chimnies, bottles, etc., constructed substantially as herein shown and described.

[This invention provides a cheap and efficient instrument or device for cleaning out chimneys, decanters, bottles, etc.]

49,459.—Machine for Cutting Harness Leather.—John Wehr, Roanoke, Ind.:

I claim the yielding guides, c, and the adjustable bits or covers, b, in combination with the pressure roller, E, all arranged to operate substantially in the manner as and for the purpose herein set forth.

[This invention consists in a series of bits, placed in an adjustable frame, and a series of guides placed in a yielding frame, the above parts being used in connection with a pressure roller, and all arranged in such a manner as to admit of leather being cut in rounded form, to serve as filling for rounded or raised straps for harness.]

49,460.—Seeding Machine.—Benj. Wieland, Orangeville, Ill.:

I claim the combination of the plow beam, B, the hopper, E, and inclined vibrating seed-receptacle, P, when the parts are arranged with relation to each other, and provided with the accessory appurtenances herein described and represented.

[This invention relates to a new and improved seeding machine for sowing seed broadcast, and to be attached to any plow, so that the operatian of plowing and sowing the seed may be simultaneously performed, and a great economy effected in labor.]

49,461.—Steam Pump.—Martin Wilcox, Sacramento, Cal.:

First, I claim the condenser, C, in combination with the receivers, R, for exhausting the receiver and discharging uncondensed steam, constructed and operating substantially as set forth.

Second, I claim the combination and arrangement of the cylinder and its piston for working the steam gate, g, in the manner substantially as described.

Third, I claim the combination of the pendulum, h, for regulating the motion of the gate, g, in the manner and substantially as described.

49,462.—Valve Gear for Steam Hammer.—C. W. Willard, Chicago, Ill.:

I claim the T-shaped lever, E, and adjustable dogs, e, in combination with the steam valve cylinder and hammer, all constructed and operating substantially in the manner and for the purpose set forth.

[This invention consists in the employment or use of a T-shaped lever, which connects with a crank on the valve stem, and which carries two adjustable dogs, in combination with a tappet attached to the crosshead of the steam engine, which imparts motion to a hammer, in such a manner that by this action of the tappet on the dogs the steam is changed at the desired points, and by adjusting said dogs on the shanks of the T-shaped lever the stroke of the hammer can be regulated.]

49,463.—Breech-loading Fire-arm.—W. T. Wilson and Henry Flather, Bridesburg, Pa.:

First, We claim the hinged breech-piece, E, having a movable axis of vibration in being opened and closed, in combination with the piston, C, which moves in line with the bore, operates against the base of the cartridge, and is locked by said breech-piece, substantially as described.

Second, In combination with the piston, C, having projections, c2, for guiding it, by sliding in grooves, as described, we claim the link, c', caused to advance and retract the piston in line with the barrel during the opening and closing movements of the breech-piece, E, and entering the grooves, f, when the breech-piece is closed, for the purpose explained.

Third, We claim the exploding pin, C, having a knob or finger piece, G, when used for locking the breech-piece, as set forth.

49,464.—Churn.—B. L. Winner, Belvidere, Ill.:

I claim the combination of the oblique stops, K, with hinged dashers, I, and bars, H, all constructed, arranged and operating as specified.

[This invention relates to a new and improved churn, of that class in which two reciprocating dashers are employed, and it consists in having the dashers attached to their rods by a joint or hinge, and having stops attached to the rods, all being arranged in such a manner that the dashers when ascending, or being forced down through the cream, will be kept in a longitudinal position, so as to act efficiently upon the cream, and, when ascending, allowed to bend down, so as to offer but little resistance to the cream, and thereby admitting of the churn being operated with but a moderate expenditure of power.]

49,465.—Swing.—F. R. Wolfinger, Vermont, Ill.:

I claim an automatic domestic swing for infants, constructed and arranged substantially as above described, so that the seat and back move in correspondence with each other.

[The object of this invention is to produce a swing for infants to take the place of a cradle. Its motion is forward and backward, instead of in lateral directions, as in the motions of the cradle. The back and the foot-board are hinged, so that they can be raised and lowered, and they are, moreover, connected to cords, which cause their motions to be communicated to each other.]

49,466.—Eave-trough Bracket.—William Yapp, Cleveland, Ohio:

I claim the bracket, A, arranged with a socket, A, to receive the pin, B, lip, b, and metallic fastener, F, substantially as and for the purpose set forth.

49,467.—Paint.—Edwin Battley (assignor to himself and James Crane), Mont Clair, N. J.:

I claim the use of creosote as a vehicle for paint.

[This invention consists in the use of creosote or carbolic acid as a vehicle for paint.]

49,468.—Padlock.—Henry D. Blake (assignor to Pand F. Corbin), New Britain, Conn.:

I claim dividing a padlock and its link into two parts or sections, hinged at one end and held and locked together by means of the spring hook, f, or it equivalent, arranged and operating substantially in the manner described

[This invention consists in transversely dividing the casing of a padlock, having its links at both of its ends permanently attached thereto and its link, at or near the center of the same, into two parts or more sections hinged together at their lower ends, upon the interior of which casing, and extending across it, a suitable holding hook is so hung and arranged that when the two parts composing the padlock are brought together they will be locked in such a manner as only to be opened with a proper-shaped key.]

49,469.—Gas Stove.—Elijah J. Caldwell (assignor to himself and Alex. M. Lesley), New York City:

I claim the arrangement and combination with the cylinder, A, of the tube or cylinder, F, sieve, G, and perforated flanged top, H, constructed and operating together substantially as and for the purposes specified.

49,470.—Grain Dryer.—Lewis S. Chichester (assignor to himself and C. W. Mills), Brooklyn, N. Y. Antedated Aug. 11, 1865:

First, I claim a series of tables, inclined in alternate opposite directions, and placed together, in a zig-zag form, as specified, so as to leave a space above the grain between one table and the next, for the passage of air, as set forth.

Second, I claim a stationary support or bar placed across and above an inclined table to support the grain and cause it to form a layer of nearly uniform thickness, substantially as specified.

Third, I claim the regulating dampers at the ends of the air spaces between the tables, in combination with a series of tables set together in a zig-zag form, as specified.

Fourth, I claim the hopper formed with partitions standing at an inclination to each other, in combination with an inclined table for grain, as specified, whereby the grain is taken away from the lower edge of the said inclined table with uniformity, as set forth.

Fifth, I claim an inclined table, to contain a layer of grain to be dried, and provided with a narrow space above and below said table through which a current of heated air is passed, as and for the purposes specified.

49,471.—Sheet-metal Spoon.—James Fallows (assignor to Porter & Booth), Philadelphia, Pa.:

I claim a sheet-metal spoon constructed of two pieces of sheet metal, substantially as described and set forth, as an improved article of manufacture.

49,472.—Let-off for Looms.—Horatio Fiske (assignor to himself and Alfred Morse), Farnumsville, Mass.:

I claim the combination of the positive motion or mechanism for effecting the regular intermittent rotary motion of the cloth beam, such consisting of the shaft, E, machinery for rotating in manner as described the screw, L, the worm gear, M, the shaft, N, the pinion, O, and the gear, P, or their mechanical equivalents, and the mechanism by which the yarn beam is caused to deliver warp and to remain at rest under circumstances, as set forth, such being the clutch wheels, d e, the shaft, S, the worm, T, the slider, g, its retracting spring and standard, or their equivalents, the gear, U, the shaft, V, the pinion, X, and the gear, Y.

I also claim the combination of the nut, l, and the screw, m, or their mechanical equivalent, or equivalents, with the said positive motion or mechanism of the cloth beam, and with the said mechanism by which the yarn beam is caused to deliver warp and to remain at rest under circumstances, as set forth.

I also claim the combination of the stationary tubular shaft, F, with the aforesaid positive motion or mechanism of the cloth beam, and with the said mechanism by which the yarn beam is caused to deliver warp and remain at rest under circumstances, as set forth.

I also claim, in connection with the said positive motion or mechanism of the cloth beam, and with the aforesaid mechanism by which the yarn-beam is caused to deliver warp and remain at rest under circumstances, as specified, the application of each or either of the worm gears to its shaft, in such manner as to enable such worm gear not only to maintain its connection with the shaft, so as to be revolved by it, but also to be moved on its shaft relatively to its screw, in manner and for the purpose of disengaging the said worm gear and screw, as specified.

I also claim the combination consisting of the clutch wheels, d e, the shaft, S, the worm, T, the slider, g, its retracting spring, k, and standard, i, the gear, U, the shaft, V, the pinion, X, and the gear, Y, or their equivalents, the whole being applied to the cloth beam, and operated by means and for the purpose substantially as above specified.

49,473.—Bung for Casks.—Michael Hickey, Boston, Mass., assignor to himself, Edwin H. Maxwell, Boston, Mass., and John T. McKnight, New York City:

I claim a metal bung, with its ring, a, and its hoop, H, formed, fitted and secured to the stave, substantially in the manner and form, and for the purposes set forth in this specification.

49,474.—Torpedo.—Henry Holden (assignor to himself and John E. Stow), New York City:

I claim a torpedo made of a sheet of absorbent material, saturated wholly or partially with a solution of fulminate of silver or of mercury, substantially as and for the purpose set forth.

[This invention consists in a torpedo made of a plain sheet of paper, or other absorbent material, which is wholly or partially saturated with a solution of fulminate of silver or of mercury, in such a manner that, after drying, the fibres or pores of the paper or other absorbent material are filled with fulminate, and a slight blow or pressure with a hard substance causes the same to explode with considerable noise.]

49,475.—Wharf, Pier and Warehouse.—J. B. Hyde, Newark, N. J., assignor to the New York Pier and Warehouse Company, New York City:

I claim a combined wharf, pier and iron base, substantially as described.

49,476.—Spring for Upholstering Purposes.—William H. Mallory, Bridgeport, Conn., assignor to himself, Nelson H. Downs and Robert N. Bassett, Derby, Conn.:

I claim a spring for upholstering and other purposes, constructed substantially as herein set forth.

49,477.—Miner's Lamp.—William McClave, Hyde Park, Pa., assignor to William P. Connell and William M. Silkman, Scranton, Pa.:

I claim a miner's lamp, made substantially as herein shown and described.

[This invention consists of a peculiarity in the form of the lamp' by which its stability when attached to the hat of the miner is increased, and the loss of oil occasioned by the swaying, tipping and and unsteadiness of the lamp is prevented.]

49,478.—Straw Cutter.—John McMahel (assignor to himself and Abner Cory), Hamilton, Ohio:

I claim, First, The arrangement of the knife, G, with its double edge, in combination with the crank wheels, H H, and slotted face-plate, P, to operate in the manner described, for the purpose specified.

Second, I claim the combination of the feeding mechanism with the knife and crank wheels, whereby the feeding and severing of the material is effected alternately, and both at each half revolution of the shaft, F, substantially as described.

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I claim constructing the latch, B, of a door lock in two parts, C and D, as described, which can be united or disconnected at pleasure, to serve the purposes of a latch or of a bolt, as desired, and operated in the manner and on the principle as herein specified.

I also claim the combination of the cam wheel or tumbler, g, with the connecting links or levers, substantially as described, for the purposes specified.

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I claim, First, An insulator for telegraph wires, etc., provided with a dead air-chamber, d, substantially as and for the purpose set forth.

Second, The combination of the plug, A, cup, C, and hook, B, constructed and operating substantially as and for the purpose described.

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Second, I also claim securing the valve against the face of the carrier piece, E, so as to prevent lateral displacement by means of a pin, i, substantially as described.

Third, I also claim so constructing and applying the valves in cabinet organs and other wind instruments, when they are supported by an outer piece, as here shown, that they can be removed by simply laying aside the spring which holds them up to their seats, and lifting the outer pieces, E, or lifting the valve from such pieces, substantially as described.

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I claim the use of sector dies, operated and arranged substantially as described, for rounding the shank of the bolt previous to the heading.

The combination of the sector dies or swages, C, swage frame, A, sliding frame, g g', for the purpose of rounding the shank of the bolt and leaving that part which is to form the head square, substantially as hereintofore described.

The combination of the drop hammer, gripping dies and detached heading tool, constructed and arranged as substantially described, for the purpose of heading bolts, while the iron is hot, by a single stroke.

Delivering the finished bolt from the dies by means of the stroke of a hammer acting in the manner substantially as hereintofore described, on the end of the bolt.

The use of the adjustable stop to support the end of the bolt blank in the dies, and regulate the depth of the round cavity of the dies to suit the required length of the shank of the bolt.

The combination of dies, K L, the clamp, j j', the drop, p', the heading tool, t', and hammers, H, constructed, arranged and operated substantially as described, for heading bolts.

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I claim a wind wheel composed of wrings or sails, B, curved so as form a portion of a circle, or a section of a scroll, in their horizontal section, and of taper form, longitudinally, as described.

I further claim a space or opening between the edges of the wrings or sails, when the latter are of the shape or form specified, for the purpose set forth.

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Second, The sample cup, f, and sample receivers, h h, in combination with the revolving drum and pans, constructed and operating substantially as and for the purpose set forth.

Third, The cistern, e, applied in combination with the revolving drum, sample cup, sample receiver and registering mechanism, constructed and operating substantially as and for the purpose specified.

Fourth, The siphon tube, a3, with stop valve, f3, and tilting tube, c3, or its equivalent, in combination with the float, e', and chamber, b3, constructed and operating substantially as and for the purpose described.

[This invention relates to an apparatus intended for the purpose of measuring alcoholic liquors, and particularly to control the quantity of liquor sold by distillers, manufacturers or dealers, with the pecial view to enable tax collectors to get at true results without rouble or danger of being cheated.]

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I claim melting material or mixtures of materials which when melted produce cast steel, cast semi-steel, or cast homogenous iron, together with carbonaceous matter, and simple or compound ores of titanium, oxides of titanium, or titanic acid or other titanium compounds, or those substances deoxydized or partially deoxydized, in order to improve the quality of the said cast steel, cast semi-steel, or homogenous iron produced.

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I claim the process above described for obtaining photographic proofs by means of photogenic substances, the preparation of which I have described, said photographic proofs being obtained, as aforesaid, without the assistance of iodide, chloride, bromide of silver, and without development.

[This invention consists in substituting in the photographic process for the iodides, chlorides or bromides of silver, a collodion containing uranium, or a uranized collodion, so that by the reductive properties of the uranium in the light direct and distinct proofs are obtained by exposure to the light under the negative, and thereby the operation of developing the picture is saved, nothing more being required after the printing but to fix the picture in any suitable manner.]

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I claim the combination with the face plate of a lathe chuck of the mandrel, E, the arm, I, and adjustable slide, H, arranged substantially as and for the purpose described.

Second, The above-described lathe chuck, provided with the adjustable slide, H, carrying the arm, I, and adjustable slide, K, substantially as and for the purpose set forth.

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MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

[See Judge Holt's letter on another page.]

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WM. D BISHOP.

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The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention the Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

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HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention is susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is out little ris in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject giving a brief history of the case, inclosing the official letters, &c.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design.	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort of extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting, or writing to, MUNN & CO., No. 37 Park Row, New York.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York

Notes and Queries

F. S., of Ill.—The expansive force of heat when acting through the medium of iron or other metal, may be regarded as practically irresistible. It has been said that iron, under the action of heat, expands with a force equal to its power of resisting a crushing pressure. Gases, however, under the action of heat expand with a force which can be restrained, and which has been accurately measured.

A. L. S., of Mich.—Oil of cloves is added to mucilage and other organic substances to prevent molding or souring.

L. T. C., of Ohio.—"Smee's Electro-metallurgy" was republished by John Wiley, of this city.

W. P. N., of Mo.—The idea that the sun is invisible from high altitudes is absurd.

W. H., of Ill.—Your notions about the difficulty of squaring the circle are correct, but it is also true that the problem would be solved by the discovery of the exact proportion between the radius and circumference.

G. P., of Mass.—It is a disgraceful fact, but the statistics collected by the census of 1860 are not yet published.

R. H., of Mass.—The day changes off the east coast of Asia. Monday in China is Sunday in the islands a few miles to the eastward.

G. W. C.—The person who exercises the mental effort termed invention is the inventor; not the mechanic who simply carries out the new idea.

Madison, Ind.—Rotating steam valves are not new, but yours may contain novel features. You had better send us a sketch and description of the plan for examination.

D. G. A., of Md.—You can procure a good turbine water wheel of Tallcot & Underhill, No. 170 Broadway.

L. H. C., of Ind.—The *Druggists' Circular* is published at No. 36 Beekman street.

H. L., of Pa.—For a list of recent valuable patents we refer you to the columns of this journal. We cannot undertake to prepare a list, with description, of those we deem most valuable.

N. J. A., of N. Y.—We do not remember ever to have seen a machine for cutting green corn from the cob for succotash.

S. F., of Ill.—Traps for catching roaches have been made, but we never yet saw one that was worth buying. Poisons are sold by druggists which are good exterminators of this household pest.

O. O., of N. J.—We have had more discussion about perpetual motion than is profitable, and we do not care to repeat it just now. We must refer you to back numbers.

C. F. B., of Mass.—It would not pay for you to get up a portable engine to go about the country sawing wood and for threshing, since you can buy them much cheaper of parties who make them for sale. There are no objections to oscillating engines, properly made, for such uses.

T. H. W., of Conn.—You can bore a hole with a drill in a lathe as "true as a die," if you only start the drill in true. It is easier and quicker to bore a small hole true with a drill than to bother with a boring tool. In case the drill is used it must be flat, and the work must be cast solid.

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Every applicant for a patent must furnish a model of his invention is susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is out little ris in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row New York.

REJECTED APPLICATIONS.

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Notes and Queries

F. S., of Ill.—The expansive force of heat when acting through the medium of iron or other metal, may be regarded as practically irresistible. It has been said that iron, under the action of heat, expands with a force equal to its power of resisting a crushing pressure. Gases, however, under the action of heat expand with a force which can be restrained, and which has been accurately measured.

A. L. S., of Mich.—Oil of cloves is added to mucilage and other organic substances to prevent molding or souring.

L. T. C., of Ohio.—"Smee's Electro-metallurgy" was republished by John Wiley, of this city.

W. P. N., of Mo.—The idea that the sun is invisible from high altitudes is absurd.

W. H., of Ill.—Your notions about the difficulty of squaring the circle are correct, but it is also true that the problem would be solved by the discovery of the exact proportion between the radius and circumference.

G. P., of Mass.—It is a disgraceful fact, but the statistics collected by the census of 1860 are not yet published.

R. H., of Mass.—The day changes off the east coast of Asia. Monday in China is Sunday in the islands a few miles to the eastward.

G. W. C.—The person who exercises the mental effort termed invention is the inventor; not the mechanic who simply carries out the new idea.

Madison, Ind.—Rotating steam valves are not new, but yours may contain novel features. You had better send us a sketch and description of the plan for examination.

D. G. A., of Md.—You can procure a good turbine water wheel of Tallcot & Underhill, No. 170 Broadway.

L. H. C., of Ind.—The *Druggists' Circular* is published at No. 36 Beekman street.

H. L., of Pa.—For a list of recent valuable patents we refer you to the columns of this journal. We cannot undertake to prepare a list, with description, of those we deem most valuable.

N. J. A., of N. Y.—We do not remember ever to have seen a machine for cutting green corn from the cob for succotash.

S. F., of Ill.—Traps for catching roaches have been made, but we never yet saw one that was worth buying. Poisons are sold by druggists which are good exterminators of this household pest.

O. O., of N. J.—We have had more discussion about perpetual motion than is profitable, and we do not care to repeat it just now. We must refer you to back numbers.

C. F. B., of Mass.—It would not pay for you to get up a portable engine to go about the country sawing wood and for threshing, since you can buy them much cheaper of parties who make them for sale. There are no objections to oscillating engines, properly made, for such uses.

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CONTENTS.—CHAPTER I.

Some Facts in Regard to Scientific Discoveries.

II.

Dry or Destructive Distillation of Organic Bodies. Products Obtained from Wood, Coal or Turf.

Ingredients of Beech-wood Tar.

III.

Products of the Distillation of Cannel Coal and their Chemical Composition.

IV.

Manufacture of Photogenic Oils and Other Useful Products from Coal, Wood and Turf—Variation of the Result According to the Temperature Employed in Distilling.

Distillation of Coal Tar.

V

Purification of Coal Oil or Kerosene, and of Bituminous Oils, together with a Brief History of these Oils; and Comparison of Artificial Products with those found in Nature.

Brief History of Bituminous and Kerosene or Empyreumatic Oils.

Comparison of Artificial Products with those found in Nature.

VI.

Petroleum or Rock Oil—Its Chemical Composition—Illuminating Power.

VII.

Refining of Petroleum.

Illuminating Power of Petroleum.

VIII.

History of Petroleum or Rock Oil.

IX.

Boring of Oil Wells.

X.

Origin of Petroleum.

General View of the Geological Distribution of Petroleum in the United States and Canada.

XI.

Preparation of Aniline Directly from Coal Tar, and its Probable Origin—Artificial Preparation of Aniline from Benzole; Transformation of the latter into Aniline—Properties of Aniline—Chemical Test for Benzole—Coloring Principles Derived from Aniline—their Mode of Preparation and Application in Dyeing.

Artificial Preparation of Aniline.

Preparation of Aniline Colors.

APPENDIX.

Amount of Petroleum Exported from New York in 1863 and 1864, and the Countries and Places to which it was Sent.

Average Prices of Petroleum in 1864 at New York and Philadelphia.

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The hall will be open for the reception of goods on Monday, the 25th of September.

Goods for Competition and Premium must be deposited before Thursday Night, the 28th of September.

Circulars, embracing details, may be had of the Actuary at the Institute.

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Those who are desirous of sending objects for exhibition have to apply to the Boards of one of the institutions mentioned, naming the objects to be sent in, and stating at the same time their size, weight and peculiarities, as well as their selling prices, either at the place of manufacture or at the place of exhibition, with indications as to the names of the firms of which the like objects may be ordered, and of the agents charged with the sale of the article to be exhibited.

The reception of goods at each of the three towns named above will begin on the 1st of May, 1865, and the time allowed for each object to remain in the exhibition will be generally four weeks at each town.

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Manufacturers and merchants desiring to avail themselves of this opportunity of bringing their products in the shortest time to the knowledge of the people of Southern Germany, and of securing by this means a more extensive sale for them are now invited to address themselves to one of the undersigned Boards, who will be happy to communicate to them copies of the printed sketches, containing all the particulars.

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March, 1865. 2 2m3t*

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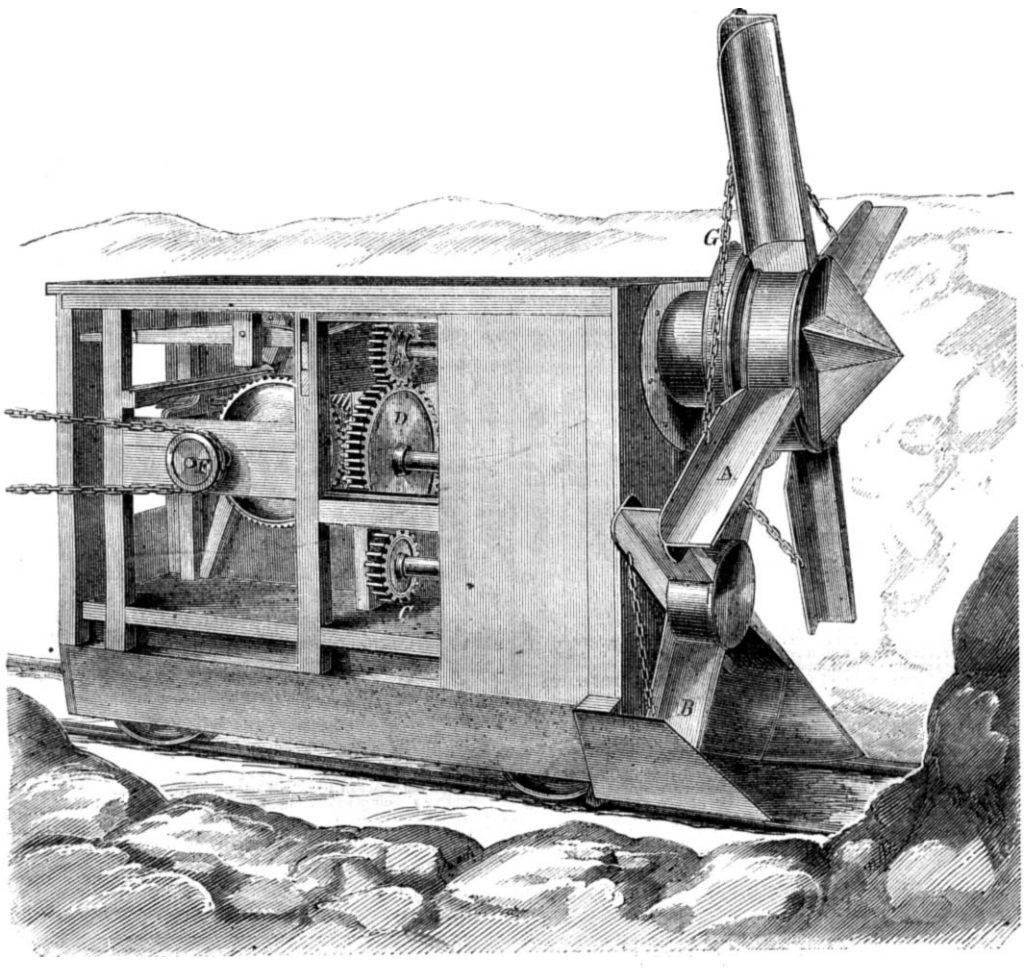
This engraving represents a new snow plow which is intended to clear railway tracks, where the common plow cannot be used, and to excavate great drifts that block up "cuts" and wholly impede the progress of the engine unless shoveled away. In detail this snow excavator consists of two sets of rotating wings or scrapers, A and B, termed "shovels" by the inventor, which are operated by the gears, C, D and E. These gears are driven by the belt or chain passing over the wheel, F, said chain being operated from the locomotive. These rotary wings move in opposite directions, and, as may be seen, they bore the snow away when brought in contact with the



BALL'S SNOW PLOW.

drift. Suitable means are provided for throwing the upper scraper out of gear with the driving wheel, D, so that the lower one is alone used if required.

By a further arrangement, not shown, the scrapers of the upper wheel are jointed at the bottom, and so fixed that they can be lowered horizontally, so that they all point forward, as the legs of a high stool would if held horizontally. They are thus enabled to make, at first, a small opening in the snow, and widen it gradually. As the upper scrapers remove the snow it falls down upon the track, and it is the office of the lower scrapers, together with the brooms, to throw it on one side, so that the rails will be kept clean. This machinery is all contained in the car shown, which is pushed ahead of a locomotive as usual. The chains, G, are intended to stay the wings against the strain imposed upon them, and they can be reversed so as to act in any direction.

A patent is now pending on this device through the Scientific American Patent Agency. For further information address the inventor, Willard A. Ball, at Laporte, Ind.

A CASE of spontaneous combustion has just occurred on board the Hamburg schooner *Ingleborg*, Captain Peter Blohm, which loaded a cargo of coals at Hartlepool, and sailed thence on Saturday last for Hamburg. All went on well till they reached the Dogger Bank on Sunday last, when suddenly an explosion took place, blowing the ship's deck high up into the air. The captain was the only one injured, his face, eyes and hands being much burnt; the rest of the crew escaped unhurt. They had just time enough to get into the stern boat and leave the ship when she went down.

Human Fallibility.

History is full of instances where the fallibility of man has proven the destruction of some great enterprise. The latest recorded is that of the Atlantic Cable, whereon millions of dollars have been spent, and high reputations jeopardized, by its failure. It is stated by the *Financial Chronicle*:—

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